Supreme Court, U.S.
FILED

No. 08-694 NOV 24 2008

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In the Supreme Court of the United States

FEDERAL TRADE COMMISSION,
PETITIONER
v.
RAMBUS INCORPORATED

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

PETITION FOR A WRIT OF CERTIORARI and APPENDIX VOLUME 1 OF 2

DAVID P. WALES JR.
Acting Director
KENNETH L. GLAZER
Senior Deputy Director
MELANIE SABO
Assistant Director
RICHARD B. DAGEN
SUZANNE MICHEL
PATRICK J. ROACH
Attorneys
Bureau of Competition
Federal Trade Commission

WILLIAM BLUMENTHAL
General Counsel
DAVID C. SHONKA
Principal Deputy General Counsel
JOHN F. DALY*
Deputy General Counsel for Litigation
WILLIAM E. COHEN
Deputy General Counsel for Policy Studies
LESLIE RICE MELMAN
MARK S. HEGEDUS
Attorneys
Federal Trade Commission
600 Pennsylvania Avenue NW
Washington, DC 20580
(202) 326-2244

**Counsel of Record*

WILSON-EPES PRINTING CO., INC. – (202) 789-0096 – WASHINGTON, D. C. 20002

QUESTIONS PRESENTED

1. Whether deceptive conduct that significantly contributes to a defendant's acquisition of monopoly power violates Section 2 of the Sherman Act.

2. Whether deceptive conduct that distorts the competitive process in a market, with the effect of avoiding the imposition of pricing constraints that would otherwise exist because of that process, is anticompetitive under Section 2 of the Sherman Act.

PARTIES TO THE PROCEEDING

Petitioner is the Federal Trade Commission. Respondent, who was the petitioner in the court of appeals below, is Rambus Incorporated.

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PETITION FOR A WRIT OF CERTIORARI

The Federal Trade Commission, pursuant to Section 16(a)(3) of the Federal Trade Commission Act (FTC Act), 15 U.S.C. 56(a)(3), respectfully petitions for a writ of certiorari to review the judgment of the United States Court of Appeals for the District of Columbia Circuit.[1]

[1] Section 16(a)(3) of the FTC Act provides, *inter alia*, that where (as is the case here) the Commission has been represented in the court of appeals by its own attorneys, it may be represented in like manner before this Court if the Solicitor General declines to file a petition for certiorari. 15 U.S.C. 56(a)(3). The Commission has exercised this authority on only three prior occasions. *See FTC* v. *Ind. Fed'n of Dentists*, 476 U.S. 447 (1986); *FTC* v. *Superior Court Trial Lawyers Ass'n*, 493 U.S. 411 (1990); *FTC* v. *Schering-Plough*

OPINIONS BELOW

The opinion of the court of appeals (Pet. App. 1a-26a) is reported at 522 F.3d 456. The order denying the Commission's petition for rehearing *en banc* (Pet. App. 380a-381a) is unreported. The Commission's opinions on liability (Pet. App. 27a-263a) and remedy (Pet. App. 264a-360a), the Commission's final order to cease and desist (Pet. App. 361a-379a), and the initial decision of the administrative law judge (Pet. App. 387a-979a) will be reported at 143 F.T.C. ___.

JURISDICTION

The judgment of the court of appeals was entered on April 22, 2008. A timely petition for rehearing *en banc* was denied on August 26, 2008. The jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATUTORY PROVISIONS INVOLVED

Relevant portions of Section 2 of the Sherman Act, 15 U.S.C. 2, and Section 5 of the FTC Act, 15 U.S.C. 45, are set forth in an appendix to this petition. Pet. App. 382a-386a.

Corp., 548 U.S. 919 (2006). The Commission does so here because it believes that the decision below will have exceptionally serious adverse consequences for enforcement of the antitrust laws.

STATEMENT

Rambus Incorporated (Rambus), a developer of computer memory technologies, is a monopolist. This case concerns Rambus's scheme to acquire monopoly power by deceiving the Joint Electronic Device Engineering Council (JEDEC) – a private standard-setting organization (SSO) – about Rambus's patent interests in technologies that JEDEC was considering for inclusion in industry-wide standards for computer memory technology, and Rambus's secret efforts to refine its patents to read on new JEDEC standards.[2] Rambus's conduct distorted the competitive process of choosing among alternative technologies for incorporation into JEDEC standards, by depriving JEDEC of the ability to assess the costs and benefits of those alternatives. It also prevented JEDEC from insisting that Rambus offer licenses on reasonable and non-discriminatory (RAND) terms as a precondition for the selection of its technology. As a result of JEDEC's unknowing selection of technologies in which Rambus was able to assert patent rights, Rambus acquired monopoly power in four technology markets. Rambus waited to assert its patent interests until the new standards had been widely implemented. Then, Rambus demanded stiff royalties from makers of the great majority of computer memory chips.

1. Standards have long played an important role in the Nation's economy. They encourage manufacturers to introduce new technologies and facilitate

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[2] A "standard" is a "set of technical specifications which either does, or is intended to, provide a common design for a product or process." See 2 Herbert Hovenkamp, Mark D. Janis & Mark A. Lemley, *IP and Antitrust* § 35.1a at 35-3 (2002).

the production and sale of interoperable products, particularly in high-technology industries. See generally Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 Cal. L. Rev. 1889, 1896-1898 (2002). Without standards, the procompetitive benefit of sophisticated products and devices that work together – even when produced by different manufacturers – would be lost. See Daniel G. Swanson & William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power*, 73 Antitrust L. J. 1, 3 (2005). SSOs often include both manufacturers that intend to practice the standards and firms like Rambus, which develop and license technologies.

Private standard-setting is a competitive process. *Ex ante* – *i.e.*, before a standard has been adopted – there often are technological alternatives. SSO members commonly choose among several technologies offered by proponents vying for inclusion in the standard. See Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up*, 74 Antitrust L.J. 603, 609 (2007). Moreover, rates that patent holders will charge after participants choose a standard can be negotiated *ex ante*. Without an opportunity for *ex ante* negotiation, and in the absence of commitments by patent holders to charge RAND rates, those who practice the standard are vulnerable to later exploitation or "hold-up." This concern exists where, as here, high switching costs make alternative technologies impracticable. See George S. Cary, Larry C. Work-Dembowski & Paul S. Hayes, *Antitrust Implications of Abuse of Standard-Setting*, 15 Geo. Mason

L. Rev. 1241, 1259-1260 (2008); Farrell *et al.*, *supra*, at 607.

Because of the potential for hold-up to extinguish the benefits of *ex ante* competition, many SSOs disfavor patented technologies and – like JEDEC – protect against hold-up and associated supra-competitive royalties by requiring patent holders to agree *ex ante* to charge RAND rates.[3] By imposing such constraints *ex ante*, SSOs ensure that the royalties charged by patent holders *ex post* – *i.e.*, after industry participants have chosen a standard and taken steps to implement it – are limited to rates commensurate with what they could have negotiated when they still faced competition from alternative technologies. See Cary *et al.*, *supra*, 1254-1255, 1259-60. A RAND requirement thus preserves the benefits of competition by ensuring that patent holders cannot secure the ability to charge monopoly prices. In the present case, Rambus's deceptive conduct thwarted JEDEC's procompetitive policies and undermined the competitive process of technology selection. See Farrell *et al.*, *supra*, at 609 ("Deceiving buyers or keeping them in the dark about the terms on which a technology will be available subverts the competitive process" to become a standard, which can lead to the "inefficient acquisition of market power that harms consumers.").

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[3] See Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 Cal. L. Rev. 1889, 1905-1906 (2002); U.S. Department of Justice and Federal Trade Commission, *Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition*, at 47-53 (Apr. 2007), *available at* http://www.usdoj.gov/atr/public/hearings/ip/222655.pdf.

2. Rambus joined JEDEC in late 1991, when JEDEC was working on standards for a widely used form of memory – synchronous dynamic random access memory or "SDRAM." Pet. App. 87a-88a. Rambus understood that "'[t]he job of JEDEC is to create standards which steer clear of patents which must be used to be in compliance with the standard whenever possible.'" *Id.* at 115a (quoting Rambus's representative to JEDEC). But starting soon after it joined, Rambus pursued a strategy, supported by Rambus's most senior executives, that was designed to subvert those goals. *Id.* at 91a-104a.

JEDEC rules prohibit the inclusion of patented technologies in standards without prior assurances that a patent holder will license its technology on RAND terms. *Id.* at 114a. The rules ensure that *ex post* royalty terms will be comparable to those that could be negotiated *ex ante*, when there was competition among alternative technologies. Rambus, however, avoided those constraints. It led JEDEC to believe not only that it had no patent interests in technologies that JEDEC was debating for inclusion in the standards, but also that it was not seeking such patents. *Id.* at 33a-34a. As the Commission found, Rambus's deceptive course of conduct included several elements:

> Rambus sat silently when other members discussed and adopted technologies that became subject to Rambus's evolving patent claims. Rambus voted and commented on inclusion of [two specific technologies] without revealing that it was seeking patent coverage of those technologies, despite language on the ballot that called for disclosure of relevant patents. Rambus twice evaded direct questions

> about its patent portfolio, coupling a nonresponsive answer with a reminder that it previously had disclosed a patent (which lacked any claims then relevant to JEDEC's work). Rambus even provided JEDEC with a list of its patents that omitted the one patent Rambus believed covered JEDEC's work.

Id. at 136a-137a. Rambus also pursued a strategy of attending JEDEC standard-setting proceedings and using information about those discussions in order to perfect its patent rights:

> Rambus was engaged in a program of amending its applications to develop a patent portfolio that would cover JEDEC's standards. Rambus made full use of information gleaned from its JEDEC participation to accomplish this objective.

Id. at 137a. Through a succession of amendments to divisional and continuation applications that related back to a 1990 patent application, Rambus ensured that subsequently issued Rambus patents would cover four specific technologies that JEDEC discussed and ultimately selected for inclusion in industry-wide standards. *Id.* at 88a-104a.

Ultimately, JEDEC selected technologies over which Rambus was able to assert patent rights. *Id.* at 104a. It did so unknowingly, however, because it was ignorant of Rambus's patent interests and its secret efforts to acquire relevant patent rights. *Id.* at 129a-135a. Thus, JEDEC had no opportunity to weigh the cost of obtaining a license from Rambus in assessing alternative technologies. Nor, for the same reasons, could JEDEC preserve the benefits of *ex*

ante competition and protect against *ex post* hold-up by obtaining a RAND commitment. *Id.* at 138a-140a, 150a-153a, 187a-190a.

Carrying out its strategy, Rambus did not disclose its patent interests while it was a member of JEDEC, or even for some time thereafter. Rather, it waited until industry members had become "locked-in" to the newly adopted standards because of the cost and delay of switching to alternatives. As Rambus's CEO explained to management, the strategy was to wait until industry members find that "getting around [Rambus patents] will be either extremely difficult or impossible." *Id.* at 103a-104a. Thus, because of Rambus's conduct, the *ex ante* competitive process for selecting technologies did not work: JEDEC could not enforce its rules against standardizing patented technologies without receipt of a RAND commitment. Having thwarted *ex ante* competition in this fashion, Rambus obtained unlawful monopoly power, and was able to, and did, demand supracompetitive royalties from those practicing the standard. *Id.* at 153a, 190a-211a, 218a-219a, 224a-225a.

3. The Federal Trade Commission issued a three-count administrative complaint in June 2002 which charged Rambus with (1) monopolization in four SDRAM technology markets, (2) attempted monopolization, and (3) engaging in unfair methods of competition, all in violation of Section 5 of the FTC Act, 15 U.S.C. 45. Pet. App. 45a. The complaint alleged that Rambus had engaged in a pattern of anticompetitive and exclusionary conduct comprising Rambus's failure to disclose that it was "actively working to develop" patents covering these technologies and "other bad-faith, deceptive conduct" that conveyed a "materially false and misleading impres-

sion" that it had no intellectual property rights in the relevant technologies. *Id.* at 45a-46a.

An administrative law judge (ALJ) rendered an initial decision and proposed order dismissing the complaint. Pet. App. 387a-879a. In July 2006, after conducting a *de novo* review of the entire record, including the ALJ's initial decision, the Commission issued its decision on liability. *Id.* at 27a-263a. Drawing on the standard of deception applicable under Section 5 of the FTC Act, the Commission set aside the ALJ's findings and conclusions other than those it specifically adopted. *Id.* at 59a, 73a-75a. Applying Section 2 of the Sherman Act, the Commission held that Rambus's course of deceptive conduct was "exclusionary," and that it "contributed significantly" to Rambus's acquisition of monopoly power in the relevant technology markets. *Id.* at 34a, 139a-140a (footnotes omitted).

Addressing the *ex ante* competition in which alternative technologies are considered in the standard-setting process, the Commission explained that an SSO cannot make a fully informed analysis of technological alternatives without accurate information about patent interests in technologies that the SSO is debating for inclusion. *Id.* at 84a. The Commission found that such information protects users of the standard against *ex post* "hold-up," either by guiding the SSO to a less costly alternative, or by allowing for an *ex ante* RAND commitment and an opportunity for *ex ante* negotiations. *Id.* at 83a-85a. In the present case, the Commission found that Rambus injured the *ex ante* competition among alternative technologies by deceptively "withh[olding] information that would have been highly material to the standard-setting process within

JEDEC." *Id.* at 139a. Because the deception "distort[ed] the selection of technologies and evade[d] protections designed by [JEDEC] to constrain the exercise of monopoly power," *id.* at 80a, the Commission ruled that Rambus's deception was "not competition on the merits" and therefore that it was exclusionary for purposes of Section 2. *Id.* at 86a, 140a, 145a-146a.

Having concluded that Rambus engaged in deceptive conduct that harmed the relevant competitive process, the Commission considered whether an adequate causal link existed between the deceptive conduct and Rambus's acquisition of monopoly power. *Id.* at 149a-159a. The Commission recognized that it was difficult to determine with certainty what choices JEDEC would have made in the absence of Rambus's deception, but concluded that, in a hypothetical "but for" world in which Rambus had not engaged in deception, there were two possible outcomes: either (1) JEDEC would have selected alternative technologies,[4] or (2) despite a bias against patented technologies, JEDEC would have selected Rambus technologies but, under JEDEC rules, required Rambus to make RAND assurances *ex ante*, thus preserving the benefits of competition from alternative technologies and protecting industry

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[4] The Commission identified factors that supported this possibility. It found that alternative technologies were available and viable, including several that had been presented to JEDEC and some that major firms in the industry preferred. Pet. App. 153a-154a. After an extensive review of the competing technologies and Rambus's claim that its own were superior or less costly and would have been chosen even if Rambus had disclosed its interests, the Commission also concluded that "Rambus ha[d] not carried the burden of establishing its inevitability/superiority defense." *Id.* at 185a.

from patent hold-up *ex post*. *Id.* at 150a-153a. The Commission therefore did not eliminate completely the possibility that, if Rambus had disclosed its patent interests and efforts to perfect those interests, JEDEC might nevertheless have selected Rambus technologies. But, the Commission explained, "[n]o matter what the specific outcome might have been, the consequences of incorporating Rambus's patented technologies into the standards would have been identified and weighed *before* the standards were adopted, *when Rambus's technologies were competing with the alternatives*." *Id.* at 188a-190a (emphasis in original).

On February 5, 2007, after supplementary briefing and oral argument on the question of remedy, the Commission issued an opinion on remedy (*id.* at 246a-360a) and a final order to cease and desist (*id.* at 361a-379a). The final order enjoined Rambus from making misrepresentations to standard-setting organizations, *id.* at 367a, and – for a period of three years from the date of the order – barred Rambus from collecting royalties for JEDEC-compliant products in excess of levels that the record suggested would have been expected had Rambus adhered to JEDEC's disclosure policy and engaged in *ex ante* negotiations with potential licensees, *id.* at 370a-371a.

4. The court of appeals granted Rambus's petition for review and vacated the Commission's order. Pet. App. 5a, 26a. The court of appeals wrote that it was guided by two antitrust principles – *first*, to be condemned as exclusionary, the conduct of a monopolist must have "anticompetitive effect" (*i.e.*, it must harm the "competitive process" and thereby harm consumers); and *second*, the antitrust plaintiff – including

the Government – bears the burden of proving the anticompetitive effect of the challenged conduct. *Id.* at 13a.

The court considered the Commission's finding that, in a hypothetical "but for" world in which Rambus disclosed its patent interests and efforts to perfect those interests, there would have been two possible outcomes: JEDEC would have either (1) chosen other, potentially non-patented technologies, or (2) selected Rambus technologies anyway, but with prior RAND commitments and an opportunity for *ex ante* negotiations. *Ibid.* The court held that, in failing to find which of these alternatives would have occurred, the Commission had failed to make an adequate finding that the deceptive course of conduct had an anticompetitive effect. *Id.* at 13a-14a, 19a, 20a.

The court of appeals based this holding on two conclusions. First, although it was willing to assume that the first possibility (*i.e.*, preventing the choice of other, nonpatented technologies) would be "indeed anticompetitive" (*id.* at 14a), the court emphasized that the Commission had not found that this result would necessarily have occurred. *Ibid.* Second, the court of appeals concluded that the second possibility (*i.e.*, avoiding a RAND commitment) could not be said to harm competition and therefore did not give rise to a violation of Section 2. *Id.* at 13a, 20a.

For the latter conclusion, the court of appeals relied on its reading of *NYNEX Corp.* v. *Discon, Inc.*, 525 U.S. 128 (1998), which it viewed as controlling authority. Pet. App. at 20a. According to the court of appeals, under *NYNEX* "an otherwise lawful monopolist's use of deception simply to obtain higher prices normally has no particular tendency to

exclude rivals and thus to diminish competition." *Id.* at 16a. Applying this reasoning, the court concluded that the hypothetical possibility that Rambus's deception merely avoided a RAND commitment was enough to insulate Rambus from Section 2 liability. *Id.* at 20a. As for the Commission's reliance on the Third Circuit's decision in *Broadcom Corp.* v. *Qualcomm Inc.*, 501 F.3d 297 (3d Cir. 2007), which had described the Commission's ruling in the present case as a "landmark" (*id.* at 311), the court of appeals concluded that *Broadcom* either does not help the Commission "in view of [the Commission's] inability to find that Rambus's behavior caused JEDEC's choice," or it "conflicts with *NYNEX*" to the extent it "rested on a supposition that there is a cognizable violation of the Sherman Act where a lawful monopolist's deceit has the effect of raising prices (without an effect on competitive structure)." Pet. App. 19a.

The court of appeals vacated the final order to cease and desist on these bases.[5]

REASONS FOR GRANTING THE PETITION

The court of appeals' doubly erroneous approach to the issue of causation and competitive effects in

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[5] Addressing possible further Commission proceedings under Section 5 of the FTC Act, the court noted in *dicta* purported weaknesses in the evidence of deception (Pet. App. 20a-26a), but did not make any determination whether the Commission's factual findings were supported by substantial evidence. Of course, this Court has held that the Commission's findings that conduct is deceptive under Section 5 of the FTC Act are entitled to great deference. See *Ind. Fed'n of Dentists*, 476 U.S. at 454; *FTC* v. *Colgate-Palmolive Co.*, 380 U.S. 374, 386 (1965).

Section 2 monopolization cases greatly undermines the ability of antitrust enforcement agencies to prevent exclusionary practices that engender monopolies and harm consumers. First, the court of appeals failed to recognize that the Commission had fully satisfied the elements of Section 2 by showing that Rambus had acquired monopoly power by exclusionary conduct – that is, conduct other than competition on the merits – and that such conduct had made a significant contribution to the creation of that power. No more stringent showing of causation is necessary to establish a Section 2 violation. Second, the court of appeals erred in faulting the Commission for failing to show that Rambus's deception had anticompetitive effects simply because of uncertainty about which of two possible consequences – namely, that JEDEC would have adopted an alternative technology or it would have required a RAND commitment – would have occurred but for that misconduct. In a case like this, the burden of any uncertainty regarding the "but for marketplace" falls on the defendant, not the Government. Further, the court of appeals ignored the Commission's detailed showing that Rambus's misconduct had seriously disrupted the competitive process in which technologies compete for inclusion in industry standards.

The court of appeals compounded these errors with respect to causation by failing to acknowledge that deceptively avoiding imposition of a RAND commitment – a commitment that is designed to preserve the benefits of *ex ante* competition and preclude "hold-up" when patented technologies that are incorporated into a standard confer monopoly power – represents consumer harm with which the antitrust laws are properly concerned. That error

creates a conflict between the decision of the court below and a recent ruling of the Third Circuit.

This case is an appropriate vehicle for the Court to provide much-needed guidance on the appropriate standard of causation and the scope of actionable competitive harm in a Section 2 monopolization case – matters that the Court has not previously addressed directly, and which are of great importance to antitrust jurisprudence. For purposes of its disposition of the case, the court of appeals accepted the Commission's findings regarding Rambus's deception in an industry standard-setting process, yet announced sweeping rules that would immunize such deception from antitrust liability in most circumstances. Those rulings not only deprive consumers of the procompetitive benefits of properly-conducted standard-setting, but also place undue limitations on Section 2 claims generally.

I. THE COURT OF APPEALS ERRED IN ITS CONCLUSIONS RESPECTING CAUSATION

1. To prove unlawful monopolization under Section 2, a plaintiff must establish two elements: "(1) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident." *United States* v. *Grinnell Corp.*, 384 U.S. 563, 570-571 (1966); see *Verizon Commc'ns Inc.* v. *Law Offices of*

Curtis V. Trinko, LLP, 540 U.S. 398, 407 (2004); *Eastman Kodak Co.* v. *Image Tech. Servs., Inc.*, 504 U.S. 451, 481 (1992); *Aspen Skiing Co.* v. *Aspen Highlands Skiing Corp.*, 472 U.S. 585, 596 n.19 (1985). In the present case, there is no dispute that Rambus acquired monopoly power. Pet. App. 12a. The only question is whether Rambus engaged in "exclusionary" conduct, *Aspen Skiing*, 472 U.S. at 605 & n.32, which had a sufficient causal connection to the acquisition of monopoly power. See Pet. App. 12a-13a.

In addressing the second required element, the court of appeals stated that, in order to be deemed "exclusionary," the challenged conduct must have "anticompetitive effect," which the government has the burden of establishing. *Id.* at 13a. As the court viewed this burden, the Commission had to show that Rambus's deceptive conduct had resulted in effects that are anticompetitive in comparison with any possible alternative outcome. *Id.* at 13a-14a. Citing the Commission's acknowledgment that one possible outcome in the absence of deception was the adoption of Rambus technologies with a RAND commitment, and holding that the avoidance of a RAND commitment is not "anticompetitive," the court of appeals concluded that "the Commission failed to demonstrate that Rambus's conduct was exclusionary." *Id.* at 20a.

The court's causation analysis – which would effectively impose a strict "but for" causation test for Section 2 cases – finds no support in this Court's

prior pronouncements. On the contrary, as the Court explained in *Standard Oil Co. of California* v. *United States*:

> [T]o demand that bare inference be supported by evidence as to what would have happened but for the adoption of the practice that was in fact adopted * * * would be a standard of proof, if not virtually impossible to meet, at least most ill-suited for ascertainment by courts.

337 U.S. 293, 309-310 (1949) (applying Section 3 of the Clayton Act, 15 U.S.C. 14). Antitrust scholars and other appellate tribunals have voiced similar concerns. As Professors Areeda and Hovenkamp have cautioned, "monopoly power will almost certainly be grounded in part in factors other than a particular exclusionary act." 3 Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law* ¶ 651g at 124 (3d ed. 2008) (Areeda & Hovenkamp). Thus, they explain, exclusionary conduct should include any conduct other than competition on the merits, or that is "necessary" to competition on the merits, that "reasonably appear[s] capable of making a significant contribution to creating or maintaining monopoly power." *Ibid.*; see *Barry Wright Corp.* v. *ITT Grinnell Corp.*, 724 F.2d 227, 230 (1st Cir. 1983) (Breyer, J.); *United States* v. *Microsoft Corp.*, 253 F.3d 34, 78-79 (D.C. Cir. 2001) (*en banc*).

The Commission engaged in a careful causation analysis in this case, fully in keeping with this

Court's teachings, which the court of appeals ignored. See Pet. App. 149a-161a. In findings that the court of appeals did not dispute, the Commission concluded that, given JEDEC members' desire to avoid patent royalties to keep costs low and the availability of technological alternatives, Rambus's deception was likely to weigh heavily in JEDEC's choice of technologies for inclusion in the proposed standards. *Id.* at 150a-156a. The Commission further found that there was a clear and undisputed causal link between the choice of Rambus technologies by JEDEC and the monopoly power in multiple technology markets that Rambus admittedly acquired. *Id.* at 156a-161a. As for Rambus's argument that other factors *might* have allowed it to achieve monopoly in any event,[6] the Commission explained that "[e]xclusionary conduct need not be the exclusive cause of the monopoly position," and quoted Areeda and Hovenkamp's observation that "'[b]ecause monopoly will almost certainly be grounded in part in factors other than a particular exclusionary act, no government seriously concerned about the evil of monopoly would condition its intervention solely on a clear and genuine chain of causation from an exclusionary act to the presence of

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[6] The Commission extensively reviewed Rambus's claim that JEDEC would have selected the Rambus technologies anyway because of their alleged superiority or lower cost, and found that Rambus had not adequately supported its claim. Pet. App. 161a-185a; see also note 4 *supra*.

monopoly.'" *Id.* at 160a (quoting 3 Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law* ¶ 651f at 83 (2d ed. 2002)).

The context of the present case amply demonstrates the error of imposing a more stringent causation standard. Standard-setting proceedings typically involve numerous participants who, before reaching agreement on which technologies to include in industry-wide standards, must consider a selection of competing technologies and a complex set of trade-offs between their costs and relative performance. It is exceedingly difficult – if not impossible – to hypothesize with any degree of certainty which factors constituted a "but for" cause of the resulting standard, in the sense that a different standard would necessarily have been chosen if such factors were altered. The Commission properly concluded, however, that Rambus obtained monopoly power and that its deception contributed significantly to that result. The court of appeals erred in requiring more.

2. In addition to ignoring the Commission's showing regarding the causal connection between Rambus's misconduct and its acquisition of monopoly power, the court of appeals faulted the Commission for failing to make a definitive finding that Rambus's conduct resulted in a specific effect that the court would accept as "anticompetitive" – *i.e.*, the choice of Rambus technologies over available alternatives. Pet. App. 13a-14a, 19a. As noted above, the Commission acknowledged that, although JEDEC's choice of alternative technologies was one possible

outcome in the "but for" world in which Rambus had not engaged in deception, a second possibility was that JEDEC might have chosen Rambus technologies, but subject to RAND commitments and the opportunity for *ex ante* negotiation – constraints that would have preserved *ex post* the benefits of *ex ante* competition among alternative technologies. See *id.* at 14a (citing Commission Remedy Opinion, Pet. App. 284a-285a).[7]

The court of appeals erred in supposing that a Section 2 tribunal must identify a particular anti-competitive effect in order to find liability. This follows from the causation principles discussed above: just as monopoly may have multiple causes, conduct may have a variety of anticompetitive effects. As Professors Areeda and Hovenkamp have written, the inherent difficulties that adjudicators

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[7] As the court of appeals' decision recognizes, the Commission addressed this uncertainty chiefly in its Remedy Opinion, in which it held that a more stringent showing of causation is necessary to justify certain remedies, such as the arguably "structural" relief of royalty-free licensing. See Pet. App. 280a-286a; see also 3 Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law* ¶ 653b at 144-145 (3d ed. 2008). That discussion responded to Rambus's own argument that a stronger causal connection was required to justify such relief than to support Section 2 liability. See Pet. App. 281a-282a (quoting brief to the Commission; also citing *United States v. Microsoft Corp.*, 253 F.3d 34, 111 (D.C. Cir. 2001) (*en banc*), and *Massachusetts* v. *Microsoft Corp.*, 373 F.3d 1199, 1233 (D.C. Cir. 2004)). Accordingly, the Commission's holding with regard to remedy has no bearing on the proper standard of causation for purposes of Rambus's liability under Section 2.

face in ascertaining the "but for" world make it appropriate that a defendant at times "suffer the uncertain consequences of its own undesirable conduct." Areeda & Hovenkamp, *supra*, ¶ 651g at 124; see also *id.* ¶ 653b at 145 ("Doubts about the conduct's contribution to the monopoly should be resolved against the monopolist.").

Nor do this Court's precedents support the court of appeals' approach. Rather, the "anticompetitive effect" that courts must find in a Section 2 case is "harm, not just to a single competitor, but to the competitive process, *i.e.*, to competition itself." *NYNEX Corp.* v. *Discon, Inc.*, 525 U.S. 128, 135 (1998). In the present case, the misconduct that the Commission found – and that the court of appeals assumed for purposes of its legal analysis – interfered directly and materially with the relevant competitive process – *i.e.*, the *ex ante* competition among technologies for inclusion in the JEDEC standard.

The JEDEC process, like that of many SSOs, is structured to permit industry members to assess competing technologies in terms of both technical features and costs, and to make trade-offs based on numerous considerations – including whether a given technology is patented and, if so, whether the patent holder is willing to make an *ex ante* commitment to license on reasonable terms. This competitive process ensures that industry participants will continue to enjoy the benefits of *ex ante* competition among alternative technologies, either through the

use of unpatented technologies or by the guarantee of RAND terms. The JEDEC process can achieve these efficiency-enhancing goals, however, only if participants have accurate information about the features and costs of competing technologies. As the Commission recognized, deception can have "'an anticompetitive effect,' [by] distorting choices [and] obscur[ing] the relative merits of alternatives * * *." Pet. App. 72a (quoting *California Dental Ass'n* v. *FTC*, 526 U.S. 756, 771 n.9 (1999)). Further, although deception may be self-correcting in other commercial contexts, the Commission explained that, in industry standard-setting proceedings, deception can "cause[] lasting competitive harm by obscuring crucial information, known only to one industry member, until it is too late to counteract the consequences." Pet. App. 79a.

Conduct that undermines the very process through which market participants seek to achieve efficient results should be recognized as "anticompetitive" or "exclusionary" for Section 2 purposes, as a matter of law. Cf. *FTC* v. *Ind. Fed'n of Dentists*, 476 U.S. 447, 461-462 (1986) ("A concerted and effective effort to withhold (or make more costly) information desired by consumers for the purpose of determining whether a particular purchase is cost justified is likely enough to disrupt the proper functioning of the price-setting mechanism of the market that it may be condemned even absent proof that it resulted in higher prices * * * ."). Such conduct "'tends to impair the opportunities of rivals'"

by misleading economic decision-makers about the relative merits of the rivals' products and is not "'competition on the merits.'" *Aspen Skiing Co.*, 472 U.S. at 605 n.32 (quoting 3 Phillip E. Areeda & Donald F. Turner, *Antitrust Law* ¶ 626b at 78 (1978)). The court of appeals erred in ignoring the corruptive effect of Rambus's deception on the competitive process.

II. THE COURT OF APPEALS TOOK AN IMPROPERLY NARROW VIEW OF COMPETITIVE EFFECTS

The court's errors respecting causation were compounded by its further error of dismissing JEDEC members' loss of the ability to secure a RAND commitment from Rambus as a mere matter of price that has no competitive significance and therefore is not exclusionary. Citing *NYNEX Corp.* v. *Discon, Inc.*, 525 U.S. 128, as controlling authority, the court of appeals ruled that deception that allowed Rambus, as a "lawful monopolist," to charge higher prices is not an "anticompetitive effect." Pet. App. 16a, 20a. In applying that precept here, the court of appeals begged the question whether the means by which Rambus acquired its monopoly were "lawful." It also ignored the pivotal role of JEDEC's RAND policy in the relevant competitive process – *i.e.*, it is a key element of the competition to become the standard and a principal means by which the benefits of *ex ante* competition are preserved.

By contrast to the facts of the present case, in *NYNEX* the deception played no role in the process by which New York Telephone had obtained its monopoly, and thus there was no basis for concluding that New York Telephone had acquired monopoly power through unlawful means. *NYNEX* addressed allegations that a lawful monopoly provider of regulated telephone services had created the false appearance that its costs had increased when it purchased certain "removal services" at a higher cost from AT&T Technologies – which had offered NYNEX rebates that it concealed from state regulators – rather than at a lower cost from Discon, which refused to participate in the rebate scheme. Although conceding that NYNEX's behavior harmed consumers by raising their telephone rates, the Court said "that consumer injury naturally flowed not so much from a less competitive market for removal services, as from the exercise of market power that is *lawfully* in the hands of a monopolist, namely, New York Telephone, combined with a deception worked upon the regulatory agency that prevented the agency from controlling New York Telephone's exercise of its monopoly power." *NYNEX*, 525 U.S. at 136 (emphasis in original).

The court of appeals' reliance on *NYNEX* is misplaced. As emphasized above, the guarantee of RAND terms was a pivotal part of the tradeoff that JEDEC members made in assessing the costs and benefits of alternative technologies that were competing for inclusion in an industry-wide standard.

The RAND requirement was the means by which JEDEC sought to preserve the benefits of *ex ante* competition, even when it selected a patented technology. Insofar as Rambus's deception of JEDEC members permitted it to avoid giving a RAND commitment, that was not the *ex post* exercise of market power by a lawful monopolist; it was the very mechanism by which Rambus secured its monopoly.

JEDEC's RAND requirement would have ensured that JEDEC members realized the benefits of *ex ante* competition among competing technologies – if an unpatented technology was not selected, then the imposition of RAND terms on a patent-holder would constrain that firm, who otherwise would be able to charge supracompetitive royalties. That outcome protects customers from patent hold-up, and its avoidance results in consumer harm.[8] The court of appeals' conclusion that the Commission failed to

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[8] See *Town of Concord* v. *Boston Edison Co.*, 915 F.2d 17, 21-22 (1st Cir. 1990) (Breyer, C.J.) (anticompetitive conduct "harms the [competitive process] when it obstructs the achievement of competition's basic goals – lower prices, better products, and more efficient production methods."), cert. denied, 499 U.S. 931 (1991); 2 Herbert Hovenkamp, Mark D. Janis & Mark A. Lemley, *IP and Antitrust* § 35.5 at 35-46 to 35-47 (Supp. 2007) ("If an antitrust plaintiff can show that the patent owner would have licensed the patent at a competitive rate had it been forced to disclose the patent before the organization acted but charged a higher rate because of the nondisclosure, we think that overcharge can properly constitute competitive harm attributable to the nondisclosure.").

show anticompetitive effects is incorrect, even under its own flawed premise.

III. REVIEW IS NEEDED TO CLARIFY AND ENSURE UNIFORMITY ON FUNDAMENTAL ISSUES OF ANTITRUST JURISPRUDENCE

1. Review is necessary in order to clarify the governing standards of causation in Section 2 cases. The ruling below erroneously departed from the causation standard that other authorities support, and which the Commission correctly applied – namely, that exclusionary conduct includes any "conduct other than competition on the merits, or other than restraints reasonably 'necessary' to competition on the merits, that reasonably appear[s] capable of making a significant contribution to creating or maintaining monopoly power." 3 Areeda & Hovenkamp, *supra*, ¶ 651g at 124. See *Barry Wright Corp.*, 724 F.2d at 230; *Microsoft*, 253 F.3d at 79.

The court of appeals' departure from this standard will impede effective Section 2 enforcement and is likely to lead to inconsistent results in monopolization cases. Commission enforcement efforts under Section 2 will be particularly stymied, because its adjudicative decisions are subject to review in any judicial circuit in which a respondent resides or does business. 15 U.S.C. 45(c). Thus, any respondent in a Commission Section 2 case presumably would seek review in the D.C. Circuit, if the decision of the court

of appeals stands. For other litigants, inconsistent approaches to causation issues in the various circuits could lead to anomalous and inconsistent results, depending upon where a Section 2 case is brought.

2. The holding of the court of appeals is also at odds with the Third Circuit's recent decision in *Broadcom Corp.* v. *Qualcomm Inc.*, 501 F.3d 297 (3d Cir. 2007). In *Broadcom*, the Third Circuit, adopting the Commission's reasoning in the present case, *id.* at 311, ruled that allegations that a patent holder deceived an SSO about the terms on which it would license its technologies stated a cause of action under Section 2. *Id.* at 314. Rejecting a district court's conclusion that a RAND commitment lost due to a defendant's deception is not a proper basis for antitrust liability, the Third Circuit ruled that, in the context of SSO deliberations, misrepresentations regarding the cost of implementing a given technology harm the competition to become the standard and increase the likelihood that patent rights will confer monopoly power on the patent holder. *Id.* at 313-14. The Third Circuit highlighted the role of RAND commitments as part of this competitive process. Specifically, it reasoned, RAND commitments are a "key indicator" of the cost of implementing a potential technology and, therefore, in the "critical period" that precedes adoption of a standard, efforts to obscure that information interfere with a properly functioning price-setting mechanism. *Id.* at 313. Based on this analysis, the court in *Broadcom* concluded that a RAND commitment lost due to

deception is a proper basis for liability under Section 2. *Id.* at 313-314 (citing, *inter alia*, *Ind. Fed'n of Dentists*, 476 U.S. at 461-462).

The court below distinguished *Broadcom,* observing that it may have "rested on the argument that the deceit lured the SSO away from non-proprietary technology." Pet. App. 19a.[9] It is clear, however, that the Third Circuit viewed competitive harm in terms of the impact of Qualcomm's deceit on the competitive standard-setting process, and not – as the court below did – on the specific "but for" outcome of the SSO's choice. *Broadcom*, 501 F.3d at 308-314. This distinction is the crux of the court of appeals' rejection of the Commission's decision in the present case. By contrast to the court in *Broadcom*, the court of appeals failed to recognize that JEDEC's choice of

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[9] *Broadcom* involved an appeal from an order granting the defendant's motion to dismiss the action on the pleadings. The complaint at issue alleged that an SSO relied upon an SSO participant's false promise in choosing a technology, a reliance that the Third Circuit noted but did not deem determinative. *Broadcom*, 501 F.3d at 314, 315. Nowhere does the Third Circuit suggest that deception must be the "sole" or "but for" cause of the SSO's choice. In fact, the opinion says that deception can be anticompetitive in the SSO context because it "increas[es] the *likelihood* that patent rights will confer monopoly power on the patent holder." *Id.* at 314 (emphasis added). Despite the differences in the procedural status of the two matters, the Third Circuit and the Commission agree that, for Section 2 purposes, competitive harm in a standard-setting context must be determined by assessing the impact of the challenged conduct on the competitive process of technology selection. *Id.* at 308-314.

Rambus patented technologies, without an *ex ante* RAND commitment, would be anticompetitive in effect because it would eliminate the protection against *ex post* patent hold-up afforded by JEDEC's competitive process. The court rejected *Broadcom* "to the extent that it may have rested on a supposition that there is a cognizable violation of the Sherman Act when a lawful monopolist's deceit has the effect of raising prices (without an effect on competitive structure) * * *." Pet. App. 19a. According to the court of appeals, such a reading of Section 2 "conflicts with *NYNEX*." *Ibid.*

Antitrust law is thus confronted with an inconsistent set of rules. The conflict cuts to the core of the analysis of harm to the competitive process, and threatens particular confusion regarding the conduct of participants in industry-wide standard-setting.[10] This uncertainty – and the risk that SSOs will be viewed as vehicles for patent holders to manipulate the standard-setting process to obtain supracompetitive royalties – inevitably will discourage participation in standard-setting proceedings.[11] More broadly,

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[10] The legal rules that govern a private SSO's decision to adopt standards in which private parties hold intellectual property rights are "critical for the long-run prospects of the economy." Daniel G. Swanson & William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power*, 73 Antitrust L. J. 1(2005).

[11] The Commission recognized this, citing a contemporaneous letter of a JEDEC member, saying that such conduct "'can destroy

however, the court of appeals' erroneous failure to recognize harm to the competitive process abrogates fundamental principles of Section 2 jurisprudence, thereby placing undue limitations on Section 2 claims, and will therefore ultimately harm consumers. Review by this Court is merited.

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the work of JEDEC. If we have companies leading us into their patent collection plates, then we will no longer have companies willing to join the work of creating standards.'" Pet. App. 67a & n.120.

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted.

DAVID P. WALES JR.
Acting Director
KENNETH L. GLAZER
Senior Deputy Director
MELANIE SABO
Assistant Director
RICHARD B. DAGEN
SUZANNE MICHEL
PATRICK J. ROACH
Attorneys
Bureau of Competition
Federal Trade Commission

NOVEMBER 2008

WILLIAM BLUMENTHAL
General Counsel
DAVID C. SHONKA
Principal Deputy General Counsel
JOHN F. DALY*
Deputy General Counsel for Litigation
WILLIAM E. COHEN
Deputy General Counsel for Policy Studies
LESLIE RICE MELMAN
MARK S. HEGEDUS
Attorneys
Federal Trade Commission

**Counsel of Record*

APPENDIX

APPENDIX A

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 07-1086

RAMBUS INCORPORATED,
Petitioner,

v.

FEDERAL TRADE COMMISSION,
Respondent.

Consolidated with 07-1124

Argued February 14, 2008
Decided April 22, 2008

On Petitions for Review of Final Orders of the Federal Trade Commission

A. Douglas Melamed argued the cause for petitioner. With him on the briefs were *Paul R.Q. Wolfson*, *Sambhav N. Sankar*, *Andrew J. Ewalt*, and *Pratik A. Shah*.

S. M. Oliva, appearing pro se, was on the brief for *amicus curiae* S. M. Oliva in support of petitioner.

John F. Daly, Deputy General Counsel for Litigation, Federal Trade Commission, argued the cause for respondent. With him on the briefs were *John D. Graubert*, Principal Deputy General Counsel, *William E. Cohen*, Deputy General Counsel for Policy Studies,

and *Leslie R. Melman, Imad D. Abyad, Richard B. Dagen,* and *Patrick J. Roach,* Attorneys.

Alan J. Weinschel, Daniel I. Prywes, and *Daniel T. O'Connor* were on the brief of *amici curiae* JEDEC Solid State Technology Association, et al. in support of respondent and affirmance. *Amber H. Rovner* and *Carmen E. Bremer* entered appearances.

Jennifer L. Pratt, Assistant Attorney General, Attorney General's Office of the State of Ohio, was on the brief for *amici curiae* State of Ohio, et al. in support of respondent. With her on the brief were *Marc Dann,* Attorney General, *Talis J. Colberg,* Attorney General, Attorney General's Office of the State of Alaska, *Terry Goddard,* Attorney General, Attorney General's Office of the State of Arizona, *Dustin McDaniel,* Attorney General, Attorney General's Office of the State of Arkansas, *John W. Suthers,* Attorney General, Attorney General's Office of the State of Colorado, *Linda Singer,* Attorney General, Attorney General's Office of the District of Columbia, *Bill McCollum,* Attorney General, Attorney General's Office of the State of Florida, *Mark Bennett,* Attorney General, Attorney General's Office of the State of Hawaii, *Lawrence G. Wasden,* Attorney General, Attorney General's Office of the State of Idaho, *Lisa Madigan,* Attorney General, Attorney General's Office of the State of Illinois, *Thomas J. Miller,* Attorney General, Attorney General's Office of the State of Iowa, *Paul J. Morrison,* Attorney General, Attorney General's Office of the State of Kansas, *Charles C. Foti, Jr.,* Attorney General, Attorney General's Office of the State of Louisiana, *G. Steven Rowe,* Attorney General, Attorney General's Office of the State of Maine, *Douglas F. Gansler,* Attorney General, Attorney General's Office of the State of Maryland, *Martha*

Coakley, Attorney General, Attorney General's Office of the Commonwealth of Massachusetts, *Michael A. Cox*, Attorney General, Attorney General's Office of the State of Michigan, *Lori Swanson*, Attorney General, Attorney General's Office of the State of Minnesota, *Jeremiah W. (Jay) Nixon*, Attorney General, Attorney General's Office of the State of Missouri, *Catherine Cortez Masto*, Attorney General, Attorney General's Office of the State of Nevada, *Anne Milgram*, Attorney General, Attorney General's Office of the State of New Jersey, *Gary King*, Attorney General, Attorney General's Office of the State of New Mexico, *Andrew M. Cuomo*, Attorney General, Attorney General's Office of the State of New York, *W.A. Drew Edmondson*, Attorney General, Attorney General's Office of the State of Oklahoma, *Hardy Myers*, Attorney General, Attorney General's Office of the State of Oregon, *Roberto J. Sánchez Ramos*, Attorney General, Attorney General's Office of the Commonwealth of Puerto Rico, *Lawrence E. Long*, Attorney General, Attorney General's Office of the State of South Dakota, *Mark L. Shurtleff*, Attorney General, Attorney General's Office of the State of Utah, *William H. Sorrell*, Attorney General, Attorney General's Office of the State of Vermont, *Robert M. McKenna*, Attorney General, Attorney General's Office of the State of Washington, *Darrell V. McGraw, Jr.*, Attorney General, Attorney General's Office of the State of West Virginia, and *Arthur Ripley, Jr.*, Attorney General, Attorney General's Office of the American Samoa Government. *Bennett Rushkoff*, Assistant Attorney General, Attorney General's Office of the District of Columbia, entered an appearance.

Before: HENDERSON and RANDOLPH, *Circuit Judges*, and WILLIAMS, *Senior Circuit Judge*.

Opinion for the Court filed by *Senior Circuit Judge* WILLIAMS.

WILLIAMS, *Senior Circuit Judge*: Rambus Inc. develops computer memory technologies, secures intellectual property rights over them, and then licenses them to manufacturers in exchange for royalty payments. In 1990, Rambus's founders filed a patent application claiming the invention of a faster architecture for dynamic random access memory ("DRAM"). In recent years, Rambus has asserted that patents issued to protect its invention cover four technologies that a private standard-setting organization ("SSO") included in DRAM industry standards.

Before an SSO adopts a standard, there is often vigorous competition among different technologies for incorporation into that standard. After standardization, however, the dynamic typically shifts, as industry members begin adhering to the standard and the standardized features start to dominate. In this case, 90% of DRAM production is compliant with the standards at issue, and therefore the technologies adopted in those standards—including those over which Rambus claims patent rights—enjoy a similar level of dominance over their alternatives.

After lengthy proceedings, the Federal Trade Commission determined that Rambus, while participating in the standard-setting process, deceptively failed to disclose to the SSO the patent interests it held in four technologies that were standardized. Those interests ranged from issued patents, to pending patent applications, to plans to amend those patent applications to add new claims; Rambus's patent rights in all these interests are said to be sufficiently connected to the invention described in Rambus's original 1990 application that its rights would

relate back to its date. Commission Br. at 46-47; Transcript of Oral Argument at 35-36; see also 35 U.S.C. §§ 120, 132. Finding this conduct monopolistic and in violation of § 2 of the Sherman Act, 15 U.S.C. § 2, the Commission went on to hold that Rambus had engaged in an unfair method of competition and unfair or deceptive acts or practices prohibited by § 5(a) of the Federal Trade Commission Act ("FTC Act"), *id.* § 45(a).

Rambus petitions for review. We grant the petition, holding that the Commission failed to sustain its allegation of monopolization. Its factual conclusion was that Rambus's alleged deception enabled it *either* to acquire a monopoly through the standardization of its patented technologies rather than possible alternatives, *or* to avoid limits on its patent licensing fees that the SSO would have imposed as part of its normal process of standardizing patented technologies. But the latter—deceit merely enabling a monopolist to charge higher prices than it otherwise could have charged—would not in itself constitute monopolization. We also address whether there is substantial evidence that Rambus engaged in deceptive conduct at all, and express our serious concerns about the sufficiency of the evidence on two particular points.

* * *

During the early 1990s, the computer hardware industry faced a "memory bottleneck": the development of faster memory lagged behind the development of faster central processing units, and this risked limiting future gains in overall computer performance. To address this problem, Michael Farmwald and Mark Horowitz began collaborating during the late 1980s and invented a higher-performance DRAM architecture. Together, they founded Rambus in March

1990 and filed Patent Application No. 07/510,898 ("the '898 application") on April 18, 1990.

As originally filed, the '898 application included a 62-page written description of Farmwald and Horowitz's invention, 150 claims, and 15 technical drawings. Under the direction of the Patent Office, acting pursuant to 35 U.S.C. § 121, Rambus effectively split the application into several (the original one and 10 "divisionals"). Thereafter, Rambus amended some of these applications and filed additional continuation and divisional applications.

While Rambus was developing a patent portfolio based on its founders' inventions, the computer memory industry was at work standardizing DRAM technologies. The locus of those efforts was the Joint Electron Device Engineering Council ("JEDEC")—then an "activity" of what is now called the Electronics Industries Alliance ("EIA") and, since 2000, a trade association affiliated with EIA and known as the JEDEC Solid State Technology Association. Any company involved in the solid state products industry could join JEDEC by submitting an application and paying annual dues, and members could receive JEDEC mailings, participate in JEDEC committees, and vote on pending matters.

One JEDEC committee, JC 42.3, developed standards for computer memory products. Rambus attended its first JC 42.3 meeting as a guest in December 1991 and began formally participating when it joined JEDEC in February 1992. At the time, JC 42.3 was at work on what became JEDEC's synchronous DRAM ("SDRAM") standard. The committee voted to approve the completed standard in March 1993, and JEDEC's governing body gave its final approval on May 24, 1993. The SDRAM standard includes two of

the four technologies over which Rambus asserts patent rights—programmable CAS latency and programmable burst length.

Despite SDRAM's standardization, its manufacture increased very slowly and asynchronous DRAM continued to dominate the computer memory market, so JC 42.3 began to consider a number of possible responses—among them specifications it could include in a next-generation SDRAM standard. As part of that process, JC 42.3 members received a survey ballot in October 1995 soliciting their opinions on features of an advanced SDRAM—which ultimately emerged as the double data rate ("DDR") SDRAM standard. Among the features voted on were the other two technologies at issue here: on-chip phase lock and delay lock loops ("on-chip PLL/DLL") and dual-edge clocking. The Committee tallied and discussed the survey results at its December 1995 meeting, which was Rambus's last as a JEDEC member. Rambus formally withdrew from JEDEC by letter dated June 17, 1996, saying (among other things) that the terms on which it proposed to license its proprietary technology "may not be consistent with the terms set by standards bodies, including JEDEC." Complaint Counsel's Exhibit ("CX") 887.

JC 42.3's work continued after Rambus's departure. In March 1998 the committee adopted the DDR SDRAM standard, and the JEDEC Board of Directors approved it in 1999. This standard retained SDRAM features including programmable CAS latency and programmable burst length, and it added on-chip PLL/DLL and dual-edge clocking; DDR SDRAM, therefore, included all four of the technologies at issue here.

Starting in 1999, Rambus informed major DRAM and chipset manufacturers that it held patent rights over technologies included in JEDEC's SDRAM and DDR SDRAM standards, and that the continued manufacture, sale, or use of products compliant with those standards infringed its rights. It invited the manufacturers to resolve the alleged infringement through licensing negotiations. A number of manufacturers agreed to licenses, see Opinion of the Commission ("Liability Op."), *In re Rambus*, Docket No. 9302, at 48 n.262 (July 31, 2006) (discussing cases); others did not, and litigation ensued, see *id.* at 17-21.

On June 18, 2002, the Federal Trade Commission filed a complaint under § 5(b) of the FTC Act, 15 U.S.C. § 45(b), charging that Rambus engaged in unfair methods of competition and unfair or deceptive acts or practices in violation of the Act, see *id.* § 45(a). Specifically, the Commission alleged that Rambus breached JEDEC policies requiring it to disclose patent interests related to standardization efforts and that the disclosures it did make were misleading. By this deceptive conduct, it said, Rambus unlawfully monopolized four technology markets in which its patented technologies compete with alternative innovations to address technical issues relating to DRAM design—markets for latency, burst length, data acceleration, and clock synchronization technologies. Compl. at 1-2, 28-29 (June 18, 2002); see also Liability Op. at 5.

Proceedings began before an administrative law judge, who in due course dismissed the Complaint in its entirety. Initial Decision ("ALJ Op.") at 334 (Feb. 23, 2004). He concluded that Rambus did not impermissibly withhold material information about its intellectual property, *id.* at 260-86, and that, in any

event, there was insufficient evidence that, if Rambus had disclosed all the information allegedly required of it, JEDEC would have standardized an alternative technology, *id.* at 310-23.

Complaint Counsel appealed the ALJ's Initial Decision to the Commission, which reopened the record to receive additional evidence and did its own plenary review. See Liability Op. at 17, 21. On July 31, 2006 the Commission vacated the ALJ's decision and set aside his findings of fact and conclusions of law. *Id.* at 21. The Commission found that while JEDEC's patent disclosure policies were "not a model of clarity," *id.* at 52, members expected one another to disclose patents and patent applications that were relevant to technologies being considered for standardization, *plus* (though the Commission was far less clear on these latter items) planned amendments to pending applications or "anything they're working on that they potentially wanted to protect with patents down the road," *id.* at 56; see generally *id.* at 51-59, 66. Based on this interpretation of JEDEC's disclosure requirements, the Commission held that Rambus willfully and intentionally engaged in misrepresentations, omissions, and other practices that misled JEDEC members about intellectual property information "highly material" to the standard-setting process. *Id.* at 68; see also *id.* at 37-48 (outlining Rambus's "Chronology of Concealment").

The Commission focused entirely on the allegation of monopolization. See *id.* at 27 n.124. In particular, the Commission held that the evidence and inferences from Rambus's purpose demonstrated that "but for Rambus's deceptive course of conduct, JEDEC either would have excluded Rambus's patented technologies from the JEDEC DRAM standards, or would

have demanded RAND assurances [*i.e.*, assurances of "reasonable and nondiscriminatory" license fees], with an opportunity for *ex ante* licensing negotiations." *Id.* at 74; see also *id.* at 77, 118-19. Rejecting Rambus's argument that factors other than JEDEC's standards allowed Rambus's technologies to dominate their respective markets, *id.* at 79-96, the Commission concluded that Rambus's deception of JEDEC "significantly contributed to its acquisition of monopoly power," *id.* at 118.

After additional briefing by the parties, see *id.* at 119-20, the Commission rendered a separate remedial opinion and final order. Opinion of the Commission on Remedy ("Remedy Op.") (Feb. 2, 2007); Final Order (Feb. 2, 2007). It held that it had the authority in principle to order compulsory licensing, but that remedies beyond injunctions against future anticompetitive conduct would require stronger proof that they were necessary to restore competitive conditions. Remedy Op. at 2-11. Applying that more demanding burden to Complaint Counsel's claims for relief, the Commission refused to compel Rambus to license its relevant patents royalty-free because there was insufficient evidence that "absent Rambus's deception" JEDEC would have standardized non-proprietary technologies instead of Rambus's; thus, Complaint Counsel had failed to show that such a remedy was "necessary to restore competition that would have existed in the 'but for' world." *Id.* at 12; see also *id.* at 13, 16. Instead, the Commission decided to compel licensing at "reasonable royalty rates," which it calculated based on what it believed would have resulted from negotiations between Rambus and manufacturers before JEDEC committed to the standards. *Id.* at 16-25. The Commission's order limits Rambus's royalties for three years to 0.25% for

JEDEC-compliant SDRAM and 0.5% for JEDEC-compliant DDR SDRAM (with double those royalties for certain JEDEC-compliant, non-DRAM products); after those three years, it forbids any royalty collection. Final Order at 2-4; Remedy Op. at 22-23.

Rambus moved for reconsideration, and the Commission denied the motion in relevant part on April 27, 2007. Rambus timely petitioned for our review of both the Commission's Final Order and its Denial of Reconsideration, see 15 U.S.C. § 45(c), and we consolidated those petitions.

Rambus challenges the Commission's determination that it engaged in unlawful monopolization—and thereby violated § 5 of the FTC Act—on a variety of grounds, of which two are most prominent. First, it argues that the Commission erred in finding that it violated any JEDEC patent disclosure rules and thus that it breached any antitrust duty to provide information to its rivals. Second, it asserts that even if its nondisclosure contravened JEDEC's policies, the Commission found the consequences of such nondisclosure only in the alternative: that it prevented JEDEC *either* from adopting a non-proprietary standard, *or* from extracting a RAND commitment from Rambus when standardizing its technology. As the latter would not involve an antitrust violation, says Rambus, there is an insufficient basis for liability.

We find the second of these arguments to be persuasive, and conclude that the Commission failed to demonstrate that Rambus's conduct was exclusionary under settled principles of antitrust law. Given that conclusion, we need not dwell very long on the substantiality of the evidence, which we address only to express our serious concerns about the breadth the Commission ascribed to JEDEC's disclosure policies

and their relation to what Rambus did or did not disclose.

* * *

In this case under § 5 of the FTC Act, the Commission expressly limited its theory of liability to Rambus's unlawful monopolization of four markets in violation of § 2 of the Sherman Act, 15 U.S.C. § 2. See Liability Op. at 27 n.124; see also *FTC v. Cement Inst.*, 333 U.S. 683, 694 (1948) (§ 5 reaches all conduct that violates § 2 of the Sherman Act). Therefore, we apply principles of antitrust law developed under the Sherman Act, and we review the Commission's construction and application of the antitrust laws *de novo*. *FTC v. Indiana Fed'n of Dentists*, 476 U.S. 447, 454 (1986); *Polygram Holding, Inc. v. FTC*, 416 F.3d 29, 33 (D.C. Cir. 2005).

It is settled law that the mere existence of a monopoly does not violate the Sherman Act. See *Verizon Commc'ns, Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 407 (2004); *United States v. Microsoft Corp.*, 253 F.3d 34, 58 (D.C. Cir. 2001) (en banc) (*per curiam*). In addition to "the possession of monopoly power in the relevant market," the offense of monopolization requires "'the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historical accident.'" *Trinko*, 540 U.S. at 407 (quoting *United States v. Grinnell Corp.*, 384 U.S. 563, 570-71 (1966)); *Microsoft*, 253 F.3d at 50 (same). In this case, Rambus does not dispute the nature of the relevant markets or that its patent rights in the four relevant technologies give it monopoly power in each of those markets. See Liability Op. at 72-73. The critical question is whether Rambus engaged in exclusionary conduct,

and thereby acquired its monopoly power in the relevant markets unlawfully.

To answer that question, we adhere to two antitrust principles that guided us in *Microsoft*. First, "to be condemned as exclusionary, a monopolist's act must have 'anticompetitive effect.' That is, it must harm the competitive *process* and thereby harm consumers. In contrast, harm to one or more *competitors* will not suffice." *Microsoft*, 253 F.3d at 58; see also *Trinko*, 540 U.S. at 407; *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 224 (1993); *Covad Commc'ns. Co. v. Bell Atlantic Corp.*, 398 F.3d 666, 672 (D.C. Cir. 2005). Second, it is the antitrust plaintiff—including the Government as plaintiff—that bears the burden of proving the anticompetitive effect of the monopolist's conduct. *Microsoft*, 253 F.3d at 58-59.

The Commission held that Rambus engaged in exclusionary conduct consisting of misrepresentations, omissions, and other practices that deceived JEDEC about the nature and scope of its patent interests while the organization standardized technologies covered by those interests. Liability Op. at 28, 68. Had Rambus fully disclosed its intellectual property, "JEDEC either would have excluded Rambus's patented technologies from the JEDEC DRAM standards, or would have demanded RAND assurances, with an opportunity for *ex ante* licensing negotiations." Liability Op. at 74. But the Commission did not determine that one or the other of these two possible outcomes was the more likely. See Transcript of Oral Argument at 43 (Commission's counsel confirming that the Commission was unable to decide which of the two possible outcomes would have occurred had Rambus disclosed). The Commission's

conclusion that Rambus's conduct was exclusionary depends, therefore, on a syllogism: Rambus avoided one of two outcomes by not disclosing its patent interests; the avoidance of either of those outcomes was anticompetitive; therefore Rambus's nondisclosure was anticompetitive.

We assume without deciding that avoidance of the first of these possible outcomes was indeed anticompetitive; that is, that if Rambus's more complete disclosure would have caused JEDEC to adopt a different (open, non-proprietary) standard, then its failure to disclose harmed competition and would support a monopolization claim. But while we can assume that Rambus's nondisclosure made the adoption of its technologies somewhat more likely than broad disclosure would have, the Commission made clear in its remedial opinion that there was insufficient evidence that JEDEC would have standardized other technologies had it known the full scope of Rambus's intellectual property. See Remedy Op. 12. Therefore, for the Commission's syllogism to survive—and for the Commission to have carried its burden of proving that Rambus's conduct had an anticompetitive effect—we must also be convinced that if Rambus's conduct merely enabled it to avoid the other possible outcome, namely JEDEC's obtaining assurances from Rambus of RAND licensing terms, such conduct, alone, could be said to harm competition. Cf. *Avins v. White*, 627 F.2d 637, 646 (3d Cir. 1980) ("Where . . . a general verdict may rest on either of two claims—one supported by the evidence and the other not—a judgment thereon must be reversed." (quoting *Allbergo v. Reading Co.*, 372 F.2d 83, 86 (3d Cir. 1966))). We are not convinced.

Deceptive conduct—like any other kind—must have an anticompetitive effect in order to form the basis of a monopolization claim. "Even an act of pure malice by one business competitor against another does not, without more, state a claim under the federal antitrust laws," without proof of "a dangerous probability that [the defendant] would monopolize a particular market." *Brooke Group*, 509 U.S. at 225. Even if deception raises the price secured by a seller, but does so without harming competition, it is beyond the antitrust laws' reach. Cases that recognize deception as exclusionary hinge, therefore, on whether the conduct impaired rivals in a manner tending to bring about or protect a defendant's monopoly power. In *Microsoft*, for example, we found Microsoft engaged in anticompetitive conduct when it tricked independent software developers into believing that its software development tools could be used to design cross-platform Java applications when, in fact, they produced Windows-specific ones. The deceit had caused "developers who were opting for portability over performance . . . unwittingly [to write] Java applications that [ran] only on Windows." 253 F.3d at 76. The focus of our antitrust scrutiny, therefore, was properly placed on the resulting harms to competition rather than the deception itself.

Another case of deception with an anticompetitive dimension is *Conwood Co. v. U.S. Tobacco Co.*, 290 F.3d 768 (6th Cir. 2001), where the Sixth Circuit found that U.S. Tobacco's dominance of the moist snuff market caused retailers to rely on it as a "category manager" that would provide trusted guidance on the sales strategy and in-store display for all moist snuff products, *id.* at 773-78. Under those circumstances, the court held that its misrepresentations to retailers about the sales strength of its products ver-

sus its competitors' strength reduced competition in the monopolized market by increasing the display space devoted to U.S. Tobacco's products and decreasing that allotted to competing products. *Id.* at 783, 785-88, 790-91; see also *LePage's Inc. v. 3M*, 324 F.3d 141, 153 (3d Cir. 2003) (calling *Conwood* "a good illustration of the type of exclusionary conduct that will support a § 2 violation").

But an otherwise lawful monopolist's use of deception simply to obtain higher prices normally has no particular tendency to exclude rivals and thus to diminish competition. Consider, for example, *NYNEX Corp. v. Discon, Inc.*, 525 U.S. 128 (1998), in which the Court addressed the antitrust implications of allegations that NYNEX's subsidiary, New York Telephone Company, a lawful monopoly provider of local telephone services, charged its customers higher prices as result of fraudulent conduct in the market for the service of removing outdated telephone switching equipment (called "removal services"). Discon had alleged that New York Telephone (through its corporate affiliate, Materiel Enterprises) switched its purchases of removal services from Discon to a higher-priced independent firm (AT&T Technologies). Materiel Enterprises would pass the higher fees on to New York Telephone, which in turn passed them on to customers through higher rates approved by regulators. *Id.* at 131-32. The nub of the deception, Discon alleged, was that AT&T Technologies would provide Materiel Enterprises with a special rebate at year's end, which it would then share with NYNEX. *Id.* By thus hoodwinking the regulators, the scam raised prices for consumers; Discon, which refused to

play the rebate game, was driven out of business.[1] Discon alleged that this arrangement was anticompetitive and constituted both an agreement in restraint of trade in violation of § 1 of the Sherman Act and a conspiracy to monopolize the market for removal services in violation of § 2. *Id.* at 132.

As to Discon's § 1 claim, the Court held that where a single buyer favors one supplier over another for an improper reason, the plaintiff must "allege and prove harm, not just to a single competitor, but to the competitive process." *Id.* at 135; see generally *id.* at 133-37. Nor, as Justice Breyer wrote for a unanimous Court, would harm to the consumers in the form of higher prices change the matter: "We concede Discon's claim that the [defendants'] behavior hurt consumers by raising telephone service rates. But that consumer injury naturally flowed not so much from a less competitive market for removal services, as from the exercise of market power that is *lawfully* in the hands of a monopolist, namely, New York Telephone,

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[1] The scheme alleged by Discon is a spin on a familiar problem of cost-based price regulation—its tendency to dilute a monopolist's incentive to seek the best price for inputs. Even where it cannot channel above-market prices to itself (either by corporate affiliation or, as here, by rebates and affiliation), regulation will have been holding the monopolist's selling prices below profit-maximizing rates, and it can therefore raise them without loss of net revenue. Where, as here, the input charges are being flowed back to the regulated monopolist (or its affiliate), payment of above-market prices even provides a profit opportunity, as it more than recovers the artificial hike in input prices (via increased final prices and flowback of the input prices). See IIIA Phillip E. Areeda & Herbert Hovenkamp, Antitrust Law: An Analysis of Antitrust Principles and Their Application ¶ 787b, at 295-301 (2d ed. 2002); see also *Assoc. Gas Dist. v. FERC*, 824 F.2d 981, 995 (D.C. Cir. 1987); cf. *Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174, 178 (D.C. Cir. 1993).

combined with a deception worked upon the regulatory agency that prevented the agency from controlling New York Telephone's exercise of its monopoly power." *Id.* at 136.

Because Discon based its § 2 claim on the very same allegations of fraud, the Court vacated the appellate court's decision to uphold that claim because "[u]nless those agreements harmed the competitive process, they did not amount to a conspiracy to monopolize." *Id.* at 139; see also *Forsyth v. Humana, Inc.*, 114 F.3d 1467, 1477-78 (9th Cir. 1997) (rejecting a claim that an insurance company's alleged kickback scheme caused antitrust injury to group health insurance customers where the evidence showed the scheme caused higher copayments and premium payments, but did "not explain how the scheme reduced competition in the relevant market"), *aff'd on other grounds*, 525 U.S. 299 (1999); *Schuylkill Energy Res., Inc. v. Penn. Power & Light Co.*, 113 F.3d 405, 414 (3d Cir. 1997) (finding conduct did not violate antitrust laws where absent that conduct consumers would still receive the same product and the same amount of competition).

While the Commission's brief doesn't mention *NYNEX*, much less try to distinguish it, it does cite *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297 (3d Cir. 2007), which in turn had cited the Commission's own "landmark" decision in the case under review here, *id.* at 311. There the court held that a patent holder's intentionally false promise to a standard-setting organization that it would license its technology on RAND terms, "coupled with [the organization's] reliance on that promise when including the technology in a standard," was anticompetitive conduct, on the ground that it increased "the likelihood

that patent rights will confer monopoly power on the patent holder." *Id.* at 314; accord *id.* at 315-16. To the extent that the ruling (which simply reversed a grant of dismissal) rested on the argument that deceit lured the SSO away from non-proprietary technology, see *id.*, it cannot help the Commission in view of its inability to find that Rambus's behavior caused JEDEC's choice; to the extent that it may have rested on a supposition that there is a cognizable violation of the Sherman Act when a lawful monopolist's deceit has the effect of raising prices (without an effect on competitive structure), it conflicts with *NYNEX*.

Here, the Commission expressly left open the likelihood that JEDEC would have standardized Rambus's technologies *even if Rambus had disclosed* its intellectual property. Under this hypothesis, JEDEC lost only an opportunity to secure a RAND commitment from Rambus. But loss of such a commitment is not a harm to competition from alternative technologies in the relevant markets. See 2 Hovenkamp et al., IP & Antitrust § 35.5 at 35-45 (Supp. 2008) [hereinafter "IP & Antitrust"] ("[A]n antitrust plaintiff must establish that the standard-setting organization would not have adopted the standard in question but for the misrepresentation or omission."). Indeed, had JEDEC limited Rambus to reasonable royalties and required it to provide licenses on a nondiscriminatory basis, we would expect *less* competition from alternative technologies, not more; high prices and constrained output tend to attract competitors, not to repel them.

Scholars in the field have urged that if nondisclosure to an SSO enables a participant to obtain higher royalties than would otherwise have been attainable, the "overcharge can properly constitute competitive

harm attributable to the nondisclosure," as the overcharge "will distort competition in the downstream market." 2 IP & Antitrust § 35.5 at 35-47. The contention that price-raising deception has downstream effects is surely correct, but that consequence was equally surely true in *NYNEX* (though perhaps on a smaller scale) and equally obvious to the Court. The Commission makes the related contention that because the ability to profitably restrict output and set supracompetitive prices is the *sine qua non* of monopoly power, any conduct that permits a monopolist to avoid constraints on the exercise of that power must be anticompetitive. But again, as in *NYNEX*, an otherwise lawful monopolist's end-run around price constraints, even when deceptive or fraudulent, does not alone present a harm to competition in the monopolized market.

Thus, if JEDEC, in the world that would have existed but for Rambus's deception, would have standardized the very same technologies, Rambus's alleged deception cannot be said to have had an effect on competition in violation of the antitrust laws; JEDEC's loss of an opportunity to seek favorable licensing terms is not as such an antitrust harm. Yet the Commission did not reject this as being a possible—perhaps even the more probable—effect of Rambus's conduct. We hold, therefore, that the Commission failed to demonstrate that Rambus's conduct was exclusionary, and thus to establish its claim that Rambus unlawfully monopolized the relevant markets.

* * *

Our conclusion that the Commission failed to demonstrate that Rambus inflicted any harm on competition requires vacatur of the Commission's orders. But

the original complaint also included a count charging Rambus with other unfair methods of competition in violation of § 5(a) of the FTC Act, 15 U.S.C. § 45(a). See Compl. at 32 ¶ 124. While the Commission dropped this aspect of its case and focused on a theory of liability premised on unlawful monopolization, see Liability Op. at 27 n.124, at least one Commissioner suggested that a "stand-alone" § 5 action would have had a "broader province" than a Sherman Act case. See Concurring Opinion of Commissioner Jon Leibowitz at 18, 21, Docket No. 9302 (Jul. 31, 2006). Because of the chance of further proceedings on remand, we express briefly our serious concerns about strength of the evidence relied on to support some of the Commission's crucial findings regarding the scope of JEDEC's patent disclosure policies and Rambus's alleged violation of those policies.

In noting our concerns, we recognize, of course, that the Commission's findings are conclusive so long as they are supported by substantial evidence. See 15 U.S.C. § 45(c); see also *Polygram Holding*, 416 F.3d at 33. The Commission's findings are murky on both the relevant margins: what JEDEC's disclosure policies were, and what, within those mandates, Rambus failed to disclose.

First, the Commission evidently could find that Rambus violated JEDEC's disclosure policies only by relying quite significantly on participants' having been obliged to disclose their work in progress on *potential* amendments to pending applications, as that work became pertinent. The Commission's counsel confirmed as much at oral argument. Transcript of Oral Argument at 37-38. Indeed, the parties stipulated that as of Rambus's last JEDEC meeting it held no patents that were essential to the manufacture or

use of devices complying with any JEDEC standard, and that when JEDEC issued the SDRAM standard Rambus had no pending patent claims that would necessarily have been infringed by a device compliant with that standard. Parties' First Set of Stipulations ¶¶ 9-10.

The case *appears* (and we emphasize *appears*, as the Commission's opinion leaves us uncertain of its real view) to turn on the idea that JEDEC participants were obliged to disclose not merely relevant patents and patent applications, but also their work in progress on amendments to pending applications that included new patent claims. We do not see in the record any formal finding that the policies were so broad, but the Commission's opinion points to testimony of witnesses that might be the basis of such a finding. Five former JC 42.3 participants testified (in some cases ambiguously) that they understood JEDEC's written policies, requiring the disclosure of *pending* applications, to also include a duty to disclose work in progress on *unfiled* amendments to those applications, and JEDEC's general counsel testified that he believed a firm was required to disclose *plans* to amend if supported by the firm's current interpretation of an extant application. See Liability Op. at 56 & nn.303-05. JEDEC participants did not have unanimous recollections on this point, however, and the Commission noted that another JC 42.3 member testified that there was no duty to disclose work on future filings. *Id.* at 56 n.305.

Reading these statements as interpretations of JEDEC's written policies seems to significantly stretch the policies' language. The most disclosure-friendly of those policies is JEDEC Manual No. 21-I, published in October 1993, which refers to "the obli-

gation of all participants to inform the meeting of any knowledge they may have of any patents, or pending patents, that might be involved in the work they are undertaking." CX 208 at 19; see also *id.* at 19 n.** ("For the purpose of this policy, the word 'patented' also includes items and processes for which a patent has been applied and may be pending."), 27 (referring to "technical information covered by [a] patent or pending patent").[2] This language speaks fairly clearly of disclosure obligations related to patents and pending patent applications, but says nothing of unfiled work in progress on potential amendments to patent applications. We don't see how a few strands of trial testimony would persuade the Commission to read this language more broadly, especially as at least two of the five participants cited merely stated that disclosure obligations reached anything in the patent "process"—which leaves open the question of when that "process" can be said to begin. See Joint Appendix 1908-09 (testimony of Desi Rhoden); *id.* at 2038 (testimony of Brett Williams).

Alternatively, to the extent the Commission reads this testimony not to broaden the interpretation of Manual 21-I, but rather to provide evidence of disclosure expectations that extended beyond those incorporated into written policies, a different problem may arise. As the Federal Circuit has said, JEDEC's patent disclosure policies suffered from "a staggering

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[2] Rambus notes that Manual 21-I was only adopted *after* JEDEC approved the SDRAM standard; the Manual came in October 1993 after JC 42.3 approved the SDRAM standard in March 1993 and JEDEC's governing body adopted it that May. But we will assume *arguendo* that the Commission could reasonably find that this new policy language merely formalized a preexisting understanding.

lack of defining details." *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081, 1102 (Fed. Cir. 2003); see also Liability Op. at 52 (stating that the record shows that JEDEC's patent policies "are not a model of clarity"). Even assuming that any evidence of unwritten disclosure expectations would survive a possible narrowing effect based upon the written directive of Manual 21-I, the vagueness of any such expectations would nonetheless remain an obstacle. One would expect that disclosure expectations ostensibly requiring competitors to share information that they would otherwise vigorously protect as trade secrets would provide "clear guidance" and "define clearly what, when, how, and to whom the members must disclose." *Infineon*, 318 F.3d at 1102. This need for clarity seems especially acute where disclosure of those trade secrets itself implicates antitrust concerns; JEDEC involved, after all, collaboration by *competitors*. Cf. *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 500 (1988) (stating that because SSO members have incentives to restrain competition, such organizations "have traditionally been objects of antitrust scrutiny"); *Am Soc'y of Mech. Eng'rs v. Hydrolevel Corp.*, 456 U.S. 556, 571 (1982) (noting that SSOs are "rife with opportunities for anticompetitive activity"). In any event, the more vague and muddled a particular expectation of disclosure, the more difficult it should be for the Commission to ascribe competitive harm to its breach. See 2 IP & Antitrust § 35.5 at 35-51 ("[A]lthough antitrust can serve as a useful check on abuses of the standard-setting process, it cannot substitute for a general enforcement regime for disclosure rules.").

The Commission's conclusion that Rambus engaged in deceptive conduct affecting the inclusion of on-chip PLL/DLL and dual-edge clocking in the DDR SDRAM

standard, which JEDEC adopted more than two years after Rambus's last JC 42.3 meeting, presents an additional, independent concern. To support this conclusion, the Commission looked to a technical presentation made to JC 42.3 in September 1994, and the survey balloting of that committee in October 1995 on whether to proceed with the consideration of particular features (including the two Rambus technologies ultimately adopted), finding that Rambus deliberately failed to disclose patent interests in any of the named technologies. Liability Op. 42-44. This finding is evidently the basis, so far as DDR SDRAM is concerned, of its conclusion that Rambus breached a duty to disclose. *Id.* at 66-68.

Once again, the Commission has taken an aggressive interpretation of rather weak evidence. For example, the October 1995 survey ballot gauged participant interest in a range of technologies and did not ask those surveyed about their intellectual property (as did the more formal ballots on proposed standards). See CX 260. The Commission nonetheless believes that every member of JC 42.3—membership that included most of the DRAM industry—was duty-bound to disclose *any* potential patents they were working on that related to *any* of the questions posed by the survey. The record shows, however, that the only company that made a disclosure at the next meeting was the one that formally presented the survey results. See Liability Op. at 44- 45; ALJ Op. at 58 ¶ 401 (citing Joint Exhibit 28, at 6). For reasons similar to those that make vague but broad disclosure obligations among competitors unlikely, it seems to us unlikely that JEDEC participants placed themselves under such a sweeping and early duty to disclose, triggered by the mere chance that a technology

might someday (in this case, more than two years later) be formally proposed for standardization.

* * *

We set aside the Commission's orders and remand for further proceedings consistent with this opinion.

So ordered.

APPENDIX B

IN THE MATTER OF RAMBUS, INC.

[PUBLIC RECORD VERSION]

Docket No. 9302

OPINION OF THE COMMISSION

By HARBOUR, Commissioner, for a unanimous Commission.

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I. INTRODUCTION[1]

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[1] This opinion uses the following abbreviations:

CA - Complaint Counsel's Appendix

CE - Order Granting Complaint Counsel's Motion for Collateral Estoppel

CCAB - Complaint Counsel's Appeal Brief

CCRB - Complaint Counsel's Reply Brief

CX - Complaint Counsel's Exhibit

DX - Demonstrative Exhibit

ID - Initial Decision of the Administrative Law Judge (ALJ)

IDF - Numbered Findings of Fact in the ALJ's Initial Opiion

JX - Joint Exhibits

RA - Respondent's Appendix

RB - Respondent's Brief on Appeal and Cross-Appeal

RFF - Respondent's Proposed Findings of Fact

RRB - Respondent's Rebuttal Brief

RX - Respondent's Exhibit

Tr. - Transcript of Trial before the ALJ.

Rambus Inc. is a developer and licensor of computer memory technologies. For more than four years during the 1990s, Rambus participated as a member of the Joint Electron Device Engineering Council (JEDEC), an industrywide standard-setting organization (SSO) that operated on a cooperative basis. Through a course of deceptive conduct, Rambus exploited its participation in JEDEC to obtain patents that would cover technologies incorporated into now-ubiquitous JEDEC memory standards, without revealing its patent position to other JEDEC members. As a result, Rambus was able to distort the standard-setting process and engage in anticompetitive "hold up" of the computer memory industry. Conduct of this sort has grave implications for competition. The Federal Trade Commission (FTC or Commission) finds that Rambus's acts of deception constituted exclusionary conduct under Section 2 of the Sherman Act, and that Rambus unlawfully monopolized the markets for four technologies incorporated into the JEDEC standards in violation of Section 5 of the FTC Act.

Standard setting occurs in many industries and can be highly beneficial to consumers. Standards can facilitate interoperability among products supplied by different firms, which typically increases the chances of market acceptance, makes the products more valuable to consumers, and stimulates output. But standard setting also poses some risks of harm to competition. By its very nature, standard setting displaces the competitive process through which the purchasing decisions of customers determine which interoperable combinations of technologies and products will survive.

Typically, the procompetitive benefits of standard setting outweigh the loss of market competition. For this reason, antitrust enforcement has shown a high degree of acceptance of, and tolerance for, standard-setting activities. But when a firm engages in exclusionary conduct that subverts the standard-setting process and leads to the acquisition of monopoly power, the procompetitive benefits of standard setting cannot be fully realized.

At the beginning of a standard-setting process, if there are a number of competing technologies, and if any one of them could win the standards battle, then no single technology will command more than a competitive price. Once the standard has been set, however, the dynamic changes. Soon after a standard is adopted, industry participants likely will start designing, testing, and producing goods that conform to the standard. Early in the process of implementing a standard, industry members still might find it relatively easy to abandon one technology in favor of another. But as time passes, and the industry commits greater levels of resources to developing products that comply with the standard, the costs of switching to alternative technologies begin to rise. Industry members may find themselves "locked in" to the standardized technology once switching costs become prohibitive. Once lock-in occurs, the owner of the standardized technology may be able to "hold up" the industry and charge supracompetitive rates.

Many SSOs have taken steps to mitigate the risk of hold-up by avoiding unknowing lock-in to a technology that may command supracompetitive rates. Many SSOs, for example, require their members to reveal any patents and/or patent applications that relate to the standard. These types of disclosures en-

able SSO members to evaluate potential standards with more complete information about the likely consequences, before the standard is finalized. Some SSOs also require members to commit to license their patented technologies on reasonable and nondiscriminatory (RAND) terms, which may further inform SSO members' analysis of the costs and benefits of standardizing patented technologies.

JEDEC operated on a cooperative basis and required that its members participate in good faith. According to JEDEC policy and practice, members were expected to reveal the existence of patents and patent applications that later might be enforced against those practicing the JEDEC standards. In addition, JEDEC members were obligated to offer assurances to license patented technologies on RAND terms, before members voted to adopt a standard that would incorporate those technologies. The intent of JEDEC policy and practice was to prevent anticompetitive hold-up.

Rambus, however, chose to disregard JEDEC's policy and practice, as well as the duty to act in good faith. Instead, Rambus deceived the other JEDEC members. Rambus capitalized on JEDEC's policy and practice – and also on the expectations of the JEDEC members – in several ways. Rambus refused to disclose the existence of its patents and applications, which deprived JEDEC members of critical information as they worked to evaluate potential standards. Rambus took additional actions that misled members to believe that Rambus was not seeking patents that would cover implementations of the standards under consideration by JEDEC. Rambus also went a step further: through its participation in JEDEC, Rambus gained information about the pend-

ing standard, and then amended its patent applications to ensure that subsequently-issued patents would cover the ultimate standard. Through its successful strategy, Rambus was able to conceal its patents and patent applications until after the standards were adopted and the market was locked in. Only then did Rambus reveal its patents–through patent infringement lawsuits against JEDEC members who practiced the standard.[2]

The Commission finds that Rambus violated Section 5 of the FTC Act by engaging in exclusionary conduct that contributed significantly to the acquisition of monopoly power in four relevant and related markets. We further find a sufficient causal link between Rambus's exclusionary conduct and JEDEC's adoption of the SDRAM and DDR-SDRAM standards (but not the subsequent DDR2-SDRAM standard). Questions remain, however, regarding how the Commission can best determine the appropriate remedy. Accordingly, the Commission orders additional briefing for further consideration of remedial issues.

II. BACKGROUND

A. Technology Background

The dispute before us involves four relevant product markets: (1) latency technology; (2) burst length technology; (3) data acceleration technology; and (4) clock synchronization technology. These markets in-

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[2] Complaint Counsel also allege that Rambus engaged in spoliation of evidence. Rambus instituted a document retention policy that entailed the systematic destruction of a large volume of documents. This destruction policy included documents related to Rambus's participation in JEDEC and Rambus's patent prosecution files. As discussed in greater detail *infra*, Section V, however, we need not resolve the spoliation question because our findings are firmly grounded on the surviving evidence.

clude technologies that, beginning in 1993, have been incorporated into the JEDEC standards for computer memory, and over which Rambus now claims patent rights.[3]

1. The Function of Computer Memory

Main memory – often referred to as random access memory, or RAM – consists of integrated circuits that hold temporary instructions and data for the central processing unit (CPU), the central "brain" of a computer system.[4] The CPU performs each command given by a computer user by extracting instructions from the computer's memory, then decoding and executing them. Most computers use a type of RAM known as dynamic random access memory (DRAM),[5] which stores and processes information while the computer is on.[6]

DRAM is only one piece in the computer hardware infrastructure. A typical personal computer is built around a motherboard – the main circuit board upon which many of the important components of a computer system are fastened. The motherboard in-

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[3] Rambus has not contested the definition of the four relevant product markets delineated by Complaint Counsel. *See infra* note. Nor does Rambus contest Complaint Counsel's allegation, or the ALJ's finding (which we adopt), that the relevant geographic market is worldwide. Complaint ¶ 117; IDF 1016-17; ID 250.

[4] Rhoden, Tr. 271-72; RA 3. Most types of RAM are volatile, which means they lose all data when the power is turned off or the system shuts down. CA A-3; RA 3.

[5] DRAM is "dynamic" because it must be refreshed every fraction of a second to prevent memory loss. Rhoden, Tr. 266-67.

[6] Rhoden, Tr. 267-68. DRAM also is incorporated into other electronic devices such as servers, printers, and cameras. IDF 3; Rhoden, Tr. 298; RA 3.

cludes, for example, the CPU, chipset, and graphics and sound cards. A computer system also includes a system clock, a power supply, mass storage devices (such as hard drives or CD ROM drives), assorted controllers that enable the computer to connect to external peripheral devices (such as monitors, printers, and scanners), and a main memory system (containing DRAM). The main memory circuits typically attach to the memory module (a small printed circuit board that plugs into the motherboard).[7] Communications between the main memory circuits and the CPU are managed by a memory controller, which generally is part of the chipset.[8] DRAM must be compatible and interoperable with other components in the same computer system.[9]

2. Evolution of RDRAM and SDRAM Memory Technologies: Breaking Through the Memory Bottleneck

In the early 1980s, an imbalance emerged in the speed at which CPU technology was developing relative to memory technology.[10] CPU speeds have doubled every eighteen months for the past two decades,[11] while memory speeds have increased more slowly. This "memory bottleneck problem"[12] became a

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[7] Rhoden, Tr. 269, 272-73; RA 4.

[8] Rhoden, Tr. 275-76; CA A-1; RA 2.

[9] *See, e.g.*, IDF 6.

[10] IDF 27-40.

[11] Farmwald, Tr. 8068 (describing "Moore's law," based on observations by Intel co-founder Gordon Moore regarding the rate of increase in CPU speeds).

[12] One of Rambus's founders, Paul Michael Farmwald, testified that the "memory bottleneck" problem was a potential bottleneck in which memory chip performance could limit computer performance. Farmwald, Tr. 8068-69, 8071-73.

widely recognized concern in the computer hardware industry during the early 1990s.[13] The industry considered several different solutions.[14]

One of those solutions – Rambus DRAM, or RDRAM – was developed by Rambus.[15] Rambus was founded in March 1990 by two professors who wanted to commercialize their concept for a new DRAM design that would break the "memory bottleneck."[16] Rambus develops, secures patents on, and licenses technologies to companies that manufacture semiconductor memory devices. Rambus is not a manufacturing company; rather, Rambus earns its revenue through the licensing of its patents.[17]

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[13] IDF 36-40.

[14] *See, e.g.*, CX 711 at 1; Sussman, Tr. 1359-60, 1364; G. Kelley, Tr. 2584-85. In the last decade most DRAMs have been synchronized with the system clock, in order to maximize the number of instructions a CPU can process in a given time. This design is called "synchronous DRAM," or SDRAM (as distinguished from earlier, asynchronous DRAMs). Jacob, 5394-95; CA A-4; RA 5.

[15] RDRAM reflected innovations with respect to bus width, the interface between the bus and computer chips, and the DRAM. IDF 86-90; CA A-4; RX 81 at 3,7; Horowitz, Tr. 8618-20; Rhoden, Tr. 400-401. Buses essentially are a computer's highway system. A memory bus comprises the lines that connect each memory device to the memory controller. Computer buses, like highways, can vary by width, which means they can have a differing number of lines linking the computer's components (just as highways may have more or fewer lanes to carry traffic). The speed at which a computer operates is affected by its buses. Rhoden, Tr. 275-76; CA A-1.

[16] IDF 27-48, 58; CX 533 at 8; CX 545 at 7; Farmwald, Tr. 8089-93; Horowitz, Tr. 8486.

[17] Parties' First Set of Stipulations, Item 2 (April 23, 2003); *see also* CX 2106 (Farmwald FTC Dep.) at 220 (*in camera*) ("[r]oyalties are the lifeblood of Rambus").

A month after its founding, on April 18, 1990, Rambus filed Patent Application No. 07/510,898 (the '898 application) with the U.S. Patent Trademark Office (PTO).[18] This application described many of the technologies developed and integrated into the initial RDRAM design. The '898 application also is the original source of the patents that Rambus has asserted with regard to the four technologies at issue in this case. The PTO issued a restriction requirement in late 1990, requiring Rambus to decide which of the multiple claimed inventions it wished to pursue in the '898 application. On March 5, 1992, Rambus responded to the PTO's demand by filing ten divisional applications.[19]

Beginning in 1990, Rambus tried to license its RDRAM technology to manufacturers of DRAM chips and DRAM-compatible microprocessors.[20] Rambus attempted to position RDRAM as the *de facto* standard.[21] Rambus made numerous presentations on RDRAM to the major DRAM manufacturers in an effort to persuade them to adopt the technology.[22] Rambus also tried to develop relationships with ma-

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[18] CX 1451.

[19] A restriction requirement forces a patent applicant to separate each distinct invention or group of inventions into separate applications known as "divisionals." Nusbaum, Tr. 1509-11.

[20] *See* CX 533 at 9-10. Major DRAM manufacturers included Samsung Electronics Co., Micron Technology, Inc., Hyundai Electronics Industries (subsequently, Hynix Semiconductor Inc.), LG Semicon Ltd., NEC Corporation, Siemens AG (subsequently, Infineon Technologies AG), Toshiba, Mitsubishi Electric Corporation, and Hitachi, Ltd. *See* CX 2747 at 7.

[21] *Id.* at 3.

[22] *See, e.g.*, Sussman, Tr. 1429-31; CX 535 at 1, 4-5; CX 543a at 11; CX 2107 at 63 (Oh FTC Dep.) (*in camera*).

jor systems companies, and pursued commitments from these companies to introduce systems using RDRAM technology.[23] RDRAM failed to achieve significant market success, however, at least in part because manufacturers were reluctant to pay royalties and licensing fees to Rambus.[24]

These manufacturers rejected RDRAM and instead turned to standards promulgated by JEDEC. JEDEC was a semiconductor engineering standardization body within the Electronic Industries Association (EIA). It comprised manufacturers and purchasers of DRAM, as well as producers of complementary products and computer systems.[25] JEDEC's JC 42.3 com-

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[23] *See, e.g.*, Kellogg, Tr. 5049-54; Bechtelsheim, Tr. 5816-19; CX 535 at 2, 5-6.

[24] *See, e.g.*, Rapp, Tr. 10248-49 (RDRAM sales represented less than 2% of the market for at least six years following the adoption of SDRAM) (providing market-share statistics); JX 36 at 7 ("Some Committee members did not feel that the Rambus patent license fee fit the JEDEC requirement of being reasonable."); CX 961 at 1 (September 1997 Intel e-mail to Rambus Chief Executive Officer (CEO) Geoff Tate, stating that, upon analyzing the royalty obligations attached to RDRAM, the industry would develop alternatives); RX 1482 at 12 (post-1996 Rambus Strategic Review stating, "Memory manufacturers need to focus on cost reduction to restore profitability" and describing RDRAM as "a guaranteed bad bet for margin enhancement").

[25] *See* J. Kelly, Tr. 1774-75; Rhoden, Tr. 293-94; Landgraf, Tr. 1685; JX 18 at 1-3. Between 1991 and 1996, JEDEC was an organization within the EIA. IDF 222; J. Kelly, Tr. 2075. EIA engages in a variety of different activities in support of the electronics industry in the United States, including government relations, marketing research, trade shows, and standard setting. J. Kelly, Tr. 1750-51, 1764. In 1998, EIA was renamed the Electronic Industries Alliance, and JEDEC became an EIA division. CX 302 at 11. By the first quarter of 2000, JEDEC became separately incorporated, but remained contractually affiliated with EIA. J. Kelly, Tr. 1752; CX 302 at 11.

mittee was responsible for RAM issues, and, in particular, for the development of DRAM standards.[26]

At issue here are three generations of DRAM standards developed and adopted by JEDEC: synchronous DRAM (SDRAM),[27] DDR SDRAM,[28] and DDR2 SDRAM.[29] In the course of designing these standards

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[26] Rhoden, Tr. 284-85, 288; Williams, Tr. 763; J. Kelly, Tr. 1769. JEDEC was divided into several committees. Each committee focused on a particular aspect of the semiconductor and solid state electronics industries, and was subdivided into several subcommittees.

[27] JEDEC designed the SDRAM standard during the early 1990s and first published it in 1993. IDF 297-315, 355-56. By 1998, JEDEC-compliant SDRAM was the most widely used type of memory device. IDF 370; CA A-5. The SDRAM standard incorporated technologies from the latency and burst length markets. IDF 355; 1013; RA 5. Rambus has asserted that its patents cover the implementations of these two technologies in the SDRAM standard. IDF 1022-29.

[28] DDR SDRAM was a second-generation standard promulgated by JEDEC. RA 2. DDR SDRAM included some of the features of SDRAM, and also incorporated new technologies that increased the speed and efficiency of the memory system. IDF 430; CA A-1. JEDEC first published DDR SDRAM in 1999. IDF 427-29; RA 2. JEDEC-compliant DDR SDRAM was forecast to overtake SDRAM as the predominant memory device by 2002-03. *See* McAfee, Tr. 7227 (presenting DX 141), 7430-31 (presenting DX 219). DDR SDRAM incorporated technologies from the latency, burst length, data acceleration, and clock synchronization markets. Rambus has asserted that its patents cover the implementations of these four technologies in the DDR SDRAM standard. IDF 1022-29.

[29] DDR2 SDRAM is the third-generation standard that JEDEC developed using SDRAM technology. RA 2; CA A-1. By the time of the 2003 trial, JEDEC had published to its members preliminary specifications for this standard that retained the latency, burst length, data acceleration, and clock synchroniza-

and determining which technologies would be incorporated, the JEDEC members evaluated numerous technologies relating to various aspects of main memory, including the technologies that comprise the four relevant product markets in this case. Rambus eventually claimed that its patents cover the specific versions of these four technologies that ultimately were adopted by JEDEC for the SDRAM, DDR SDRAM, and DDR2 SDRAM standards.

3. The Four Relevant Technology Markets

a. Latency Technology

Latency is a measure of the amount of time between a request and a response.[30] Memory latency is the length of time between the memory's receipt of a read request and its release of data corresponding with the request.[31] Latency technology comprises those technologies used to control the length of this time period.[32]

In the early 1990s, several types of latency technology were available, including programmable latency, fixed latency, blowing a fuse on a DRAM, and dedicated pins. These alternative solutions are discussed in greater detail below.[33] JEDEC first incorporated programmable column address strobe (CAS) latency into its SDRAM standard and retained the technology in its DDR SDRAM and DDR2 SDRAM stan-

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tion technologies that Rambus has claimed infringe its patents. RA 2.

[30] IDF 114.

[31] Horowitz, Tr. 8529-30.

[32] McAfee, Tr. 7348.

[33] *See infra* Section IV.C.3.b.

dards.[34] Programmable CAS latency controls data output timing by determining the number of clock cycles that should be allowed to elapse after a defined point.[35] Programmable CAS latency provides users of DRAMs with flexibility, *i.e.*, a single part can be programmed so as to provide the optimal latency in a variety of systems.[36]

Rambus claims that its patents cover JEDEC's implementation of programmable CAS latency technology.

b. Burst Length Technology

Burst length technology controls the amount of data transferred between the CPU and memory in each transmission. JEDEC's SDRAM, DDR SDRAM, and DDR2 SDRAM standards adopted programmable burst length technology, which provides a means for varying the number of cycles of data that are transmitted to the memory controller in response to an individual command.[37] Programmable burst length technology is similar to programmable CAS latency technology in that it allows DRAM customers to use one part for many different types of machines that require different burst lengths.[38]

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[34] IDF 355, 433; RA 2, 5.

[35] CA A-3.

[36] Soderman, Tr. 9346-47, 9433-34; Kellogg, Tr. 5140.

[37] CA A-3

[38] *See, e.g.*, G. Kelley, Tr. 2550-51 ("The programmable [burst length] feature allowing you to make that selection when the PC or computer powered up was a nice feature because it allowed you to use devices that were common from multiple suppliers, put them into many different types of machines. . . . One part number fits many applications.").

In the early 1990s several alternatives to programmable burst length were available, as discussed in greater detail below.[39] One alternative was the use of fixed burst length parts.[40] Another alternative was to use "burst terminate commands," which establish a long burst length as the default and use the memory controller to terminate the burst if a shorter burst length is desired.[41]

Rambus claims that its patents cover JEDEC's implementation of programmable burst length technology.

c. Data Acceleration Technology

Data acceleration technology determines the speed at which data are transmitted between the CPU and memory. JEDEC's DDR SDRAM and DDR2 SDRAM standards adopted one particular type of data acceleration technology, known as dual-edge clocking, which captures data off both the rising and falling edges (the "tick" and the "tock") of the clock.[42] This technology enables twice the amount of data to be sent in each clock cycle compared to single-edge clocking, by which data are sent only on one edge of the clock.[43]

When JEDEC was considering whether to adopt dual-edge clocking technology as part of its DDR SDRAM standard, several alternatives were available. As discussed in greater detail below,[44] alterna-

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[39] *See infra* Section IV.C.3.b.

[40] Jacob, Tr. 5398-99.

[41] Jacob, Tr. 5409-10.

[42] RA 3.

[43] CA A-2.

[44] *See infra* Section IV.C.3.b.

tive technologies included interleaving ranks on the module (using different clock signals for separate groups of DRAM chips), double clock frequency (operating a single-edge clock at twice the frequency of a dual-edge clock[45]), and toggle mode (which, as formulated by IBM, combined synchronous and asynchronous features[46]).

Rambus claims that its patents cover JEDEC's implementation of dual-edge clocking technology.

d. Clock Synchronization Technology

Clock synchronization technologies coordinate the internal clock on each DRAM chip with the timing of the computer's system clock. Phase lock loop (PLL) and delay lock loop (DLL) technologies use circuits to align more closely the timing of the internal clock on each DRAM with the system clock.[47] Rambus developed a technology that places a PLL/DLL[48] on the SDRAM chip itself.[49] On-chip PLL/DLL clock synchronization technology was incorporated into

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[45] Jacob, Tr. 5433-34.

[46] *See* Jacob, Tr. 5608, 5416-17; Soderman, Tr. 9398; G. Kelley, Tr. 2514.

[47] Jacob, Tr. 5442-43; Kellogg, Tr. 5150-55; RA 4; CA A-3. PLLs use voltage oscillators to synchronize the internal clock with the system clock. *See* Jacob, Tr. 5443, 5616-17; Soderman, Tr. 9401. In contrast, DLLs introduce a variable amount of delay into the internal clock to synchronize that clock with the system clock. *See* Jacob, Tr. 5443, 5616-17; Soderman, Tr. 9401.

[48] Horowitz, Tr. 8607 (Rambus co-founder testified that, under his usage of the terms, "a PLL is the generic term for any circuitry that adjusts phase, so a DLL is a kind of PLL").

[49] Farmwald, Tr. 8117-18; Horowitz, Tr. 8503-05; 8521-22, 8527-28.

JEDEC's DDR SDRAM and DDR2 SDRAM standards.

One alternative approach to on-chip PLL/DLL involved placing a PLL/DLL circuit on the memory controller that synchronizes all DRAMs.[50] Another approach involved placing one or more PLL/DLL circuits on the memory module.[51] Still other alternatives involved the use of vernier circuits, which introduce static delays on a signal to reduce timing uncertainties in a memory system, or reliance on a data strobe to signal the memory controller the timing of data capture.[52] These alternatives, which were considered by JEDEC prior to its adoption of on-chip PLL/DLL, are discussed in greater detail below.[53]

Rambus claims that its patents cover JEDEC's implementation of on-chip PLL/DLL technology.

B. Procedural History

1. History of FTC Matter

The Complaint in this matter was issued on June 18, 2002. The Complaint charged that Rambus: (1) monopolized certain memory technology markets through a pattern of anticompetitive and exclusionary conduct; (2) attempted to monopolize these markets; and (3) engaged in unfair methods of competition.[54]

The Complaint's allegations focused on Rambus's participation in JEDEC. It alleged that Rambus de-

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[50] Jacob, Tr. 5445.

[51] Jacob, Tr. 5448-49.

[52] Jacob, Tr. 5450, 5456-57.

[53] *See infra* Section IV.C.3.b.

[54] *See* Complaint ¶¶ 122-24.

ceived JEDEC's members by, for example, concealing the fact that it

> was actively working to develop, and did in fact possess, a patent and several pending patent applications that involved specific technologies proposed for and ultimately adopted in the relevant standards. By concealing this information – in violation of JEDEC's own operating rules and procedures – and through other bad-faith, deceptive conduct,

Rambus allegedly conveyed the "materially false and misleading impression that it possessed no relevant intellectual property rights"[55] and that it had no plans to enforce any intellectual property rights that might later become relevant, leaving a materially misleading impression of its intellectual property ownership and plans.[56] The Complaint further alleged that Rambus's conduct resulted in anticompetitive effects including: increased royalties; increased prices for memory products compliant with JEDEC standards; decreased incentives to produce memory using JEDEC-compliant memory technology; and decreased incentives to participate in, and rely on, standard-setting organizations and activities.[57] According to the Complaint, Rambus gave no notice that it intended to claim patent rights over technologies used in JEDEC's DRAM standards, and, by failing to do so, likely affected the content of those stan-

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[55] *See* Complaint ¶ 2; *see also id.* ¶¶ 54 (alleging deception and bad-faith conduct), 71 (alleging that Rambus conveyed "a materially false and misleading impression").

[56] *See* Complaint ¶¶ 70-78.

[57] *See* Complaint ¶¶ 119-120.

dards and/or the terms on which Rambus later licensed its patent rights.[58]

a. Pre-Trial Orders

The case was first assigned to Administrative Law Judge (ALJ) James P. Timony and, upon his retirement, was reassigned to Chief ALJ Stephen J. McGuire.[59] Before retiring, ALJ Timony issued two orders on February 26, 2003: first, an Order Granting Complaint Counsel's Motion for Collateral Estoppel; and second, an Order on Complaint Counsel's Motions for Default Judgment and for Oral Argument. Both orders influenced the trial and ALJ McGuire's Initial Decision.

On February 12, 2003, Complaint Counsel filed a motion seeking recognition of the collateral estoppel effect of prior factual findings that Rambus had destroyed material evidence. ALJ Timony granted the motion, thus barring Rambus from re-litigating certain findings of fact made by the district court in prior private litigation, *Rambus Inc. v. Infineon Technologies AG*.[60] Those findings included:

1. When Rambus instituted its document retention policy in 1998, it did so, in part, for the purpose of getting rid of documents that might be harmful in litigation.

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[58] *See* Complaint ¶¶ 62, 65, 69, 70-78, 86.

[59] All references within this opinion to "the ALJ," unless otherwise specifically identified, will refer to ALJ McGuire.

[60] 155 F. Supp. 2d 668 (E.D. Va. 2001), *aff'd in part and rev'd in part*, 318 F.3d 1081 (Fed. Cir. 2001). The district court's findings, upon which ALJ Timony relied, were not raised on appeal to the Federal Circuit.

2. Rambus, at the time it implemented its document retention policy, . . . [c]learly . . . contemplated that it might be bringing patent infringement suits during this timeframe if its efforts to persuade semi-conductor manufacturers to license its JEDEC-related patents were not successful.

3. Rambus's document destruction was done in anticipation of litigation.[61]

Complaint Counsel also moved for default judgment as a remedy to counter Rambus's intentional destruction of documents. ALJ Timony denied the motion, but set forth seven rebuttable adverse presumptions against Rambus. The presumptions included:

1. Rambus knew or should have known from its pre-1996 participation in JEDEC that developing JEDEC standards would require the use of patents held or applied for by Rambus;

2. Rambus never disclosed to other JEDEC participants the existence of these patents; [and]

3. Rambus knew that its failure to disclose the existence of these patents to other JEDEC participants could serve to equitably estop Rambus from enforcing its patents as to other JEDEC participants.[62]

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[61] CE at 5 (internal quotations omitted).

[62] Order on Complaint Counsel's Motions for Default Judgment and for Oral Argument at 9 (Feb. 26, 2003).

Four additional presumptions addressed the foreseeability of litigation and Rambus's document retention program.[63]

b. ALJ McGuire's Initial Decision

On February 17, 2004, ALJ McGuire issued his Initial Decision and Proposed Order dismissing the Complaint in its entirety. Specifically, although he noted that Section 5 of the FTC Act authorizes the FTC to define and proscribe unfair methods of competition, the ALJ determined that Complaint Counsel had established no basis for finding a violation of Section 5.[64] He concluded that Complaint Counsel's arguments lacked a reasonable basis in law,[65] and ruled that Complaint Counsel's factual showing was insufficient to establish a violation even if the legal theories had been deemed adequate.[66]

The ALJ found that the adverse presumptions entered by ALJ Timony were not material to the disposition of the case. The ALJ found no indication that Rambus had destroyed any relevant and material documents. He found that the first and second presumptions were moot because Rambus was not required to disclose its patents or patent applications.[67] He also rejected the second presumption on the ground that Rambus's conduct raised sufficient red

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[63] *Id.* (announcing presumptions that Rambus's document retention program failed to provide adequate guidance and direction to its employees and that Rambus knew or should have known that litigation over the enforcement of its patents was reasonably foreseeable).

[64] ID at 254.

[65] ID at 254-60.

[66] ID at 259-61.

[67] ID at 244.

flags to put members of JEDEC on notice that Rambus had applications pending.[68] The ALJ then found the remaining five adverse presumptions to be irrelevant to the material issues of the case.

The ALJ found that there was no causal link between JEDEC's adoption of Rambus's technology into its standards and Rambus's acquisition of monopoly power. Rather, the ALJ found that Rambus acquired its monopoly power as a result of superior technology and market preferences.[69]

Moreover, the ALJ found that JEDEC, and many members of the DRAM industry, were aware of Rambus's patent portfolio. Thus, according to the ALJ, no member of JEDEC reasonably could have relied on any misrepresentation or omission by Rambus in its dealings with JEDEC.[70] The ALJ found no basis for ascribing to Rambus an intent to deceive.[71]

The ALJ concluded that the challenged conduct did not result in any anticompetitive effect because Complaint Counsel failed to prove there were viable alternatives to Rambus's technologies.[72] Furthermore, according to the ALJ, Complaint Counsel did not demonstrate that Rambus's conduct had resulted in higher prices to consumers.[73] In contrast, the ALJ found that Rambus had put forth legitimate business justifications for its conduct. He agreed with Rambus that its secrecy regarding its patent applications con-

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[68] ID at 244-45.

[69] ID at 300-04.

[70] ID at 304-09.

[71] ID at 295-300, 331-32.

[72] ID at 312-16.

[73] ID at 323-26.

stituted normal and legitimate protection of trade secrets. The ALJ concluded that this business justification precluded a finding of exclusionary conduct.[74]

Finally, the ALJ found that the DRAM industry never became locked into using Rambus's technologies as incorporated into the JEDEC standards, because "economic evidence shows that switching costs and coordination issues would not prevent the DRAM industry from going to alternatives."[75]

c. Questions Raised on Appeal/Cross Appeal

Complaint Counsel filed a notice of appeal on March 1, 2004. They challenge virtually all of the ALJ's rulings and ask that the Initial Decision be set aside in its entirety. They contend that Rambus acquired monopoly power by pursuing a secret and deliberate pattern of conduct to obtain patents covering JEDEC standards. According to Complaint Counsel, Rambus's course of conduct undermined the fundamental purpose of JEDEC to adopt open standards; contravened JEDEC's procedures for adopting patented technologies only on the basis of full information and after securing a commitment to reasonable licensing terms; breached Rambus's duty of good faith; and also violated Rambus's specific obligation, as a member of JEDEC, to disclose patents and patent applications that might be involved in JEDEC's work.[76] Complaint Counsel claim that the facts and a proper application of the law show that Rambus violated Section 5 of the FTC Act, and they offer a pro-

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[74] ID at 287-89.

[75] ID at 328, 326-29.

[76] CCAB at 27-28.

posed cease and desist order to remedy the alleged violation.

Rambus filed a cross appeal arguing that the ALJ erred by applying a "preponderance of the evidence" standard to the government's case, rather than requiring Complaint Counsel to meet a "clear and convincing" burden of proof. Rambus contends that the heightened burden of proof is required due to an "inherent tension" between the interests served by the patent and antitrust laws, as well as by similarities to cases that have required clear and convincing evidence in assessing alleged failures to disclose material information and bad faith enforcement of patents. Rambus also argues that the nature of the remedy sought by Complaint Counsel (which Rambus views as essentially terminating its patent rights), and important policy considerations implicated by SSOs, merit application of the clear and convincing standard.

d. Re-Opening of the Record Before the Commission

The ALJ closed the record on October 9, 2003. The Commission later reopened the record to admit supplemental evidence – entering orders on May 13, 2005, July 20, 2005, and February 2, 2006 – after finding compelling circumstances. The first two orders reopened the record to allow the admission of documents produced in the *Infineon* litigation relating to Rambus's alleged spoliation of evidence, as well as the submission of amended proposed findings of fact and conclusions of law in light of this supplemental evidence. In the third order, the Commission reopened the record to admit documents on Rambus's

back-up tapes, described as newly found, from discovery produced during the *Hynix* litigation.[77]

e. Motion for Sanctions

On August 10, 2005, Complaint Counsel moved for sanctions, asserting that Rambus had committed spoliation of evidence. Complaint Counsel asked for entry of default judgment or such other relief as the Commission deems appropriate. Rambus replied on August 17, 2005, arguing that Complaint Counsel failed to prove that Rambus acted in egregious bad faith when it adopted its document retention policy or that the effect of that policy has been to deprive Complaint Counsel of the ability to obtain a full and fair adjudication of this case.

2. Non-FTC Judicial Developments Relating to this Proceeding

Rambus is engaged in myriad litigations involving its efforts to enforce patents it claims cover JEDEC's DRAM standards. Rambus has sued, or been sued by, several of the major DRAM manufacturers, including Samsung, Hynix, Infineon, and Micron.[78] Al-

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[77] For discussion of the *Infineon* and *Hynix* litigation, *see infra* Section II.B.2.

[78] These actions include a variety of patent infringement and antitrust-related allegations. *See, e.g.*, Hynix Semiconductor Inc. v. Rambus Inc., No. CV-00-20905 RMW (N.D. Cal.); Rambus Inc. v. Hynix Semiconductor Inc., et al., No. CV-05-00334 RMW (N.D. Cal.); Rambus Inc. v. Samsung Electronics Co., No. CV-05-02298 RMW (N.D. Cal.); Samsung Electronics Co. v. Rambus, Inc., No. 3:05-CV-00406-REP (E.D. Va.); Micron Technology, Inc. v. Rambus Inc., No. 3:06-CV-00132-REP (E.D. Va.); Rambus Inc. v. Micron Technology, Inc., No. CV-06-00244 RMW (N.D. Cal.); Micron Technology, Inc. v. Rambus Inc., No. CV-00-792-KAJ (D. Del.); Rambus Inc. v. Micron Technology, Inc., *et. al.*, No. 04-431105 (San Francisco Super. Ct.).

though Rambus and Infineon settled their litigation in 2005, all of the actions involving other companies are ongoing. In addition, the U.S. Department of Justice (DOJ) is investigating whether the major DRAM manufacturers engaged in price fixing in the DRAM market; four of those manufacturers have entered plea agreements.[79] While we will not discuss each of these non-FTC actions in detail, we will highlight certain relevant information.

In late 2000, Rambus sued Infineon Technologies AG, a manufacturer of semiconductor memory devices, in the U.S. District Court for the Eastern District of Virginia for infringement of four patents. Infineon counterclaimed, alleging Rambus committed fraud under Virginia state law by failing to disclose to JEDEC its patents and patent applications related to the organization's SDRAM and DDR SDRAM standards, as required by JEDEC's rules. During trial, Judge Payne granted judgment as a matter of law (JMOL) for Infineon, holding that Infineon did not infringe Rambus's patents. The jury later found Rambus liable for fraud associated with JEDEC's standard-setting activities on SDRAM and DDR

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[79] *See* Plea Agreement, United States v. Samsung Electronics Co., No. CR 05-0643 (PJH) (N.D. Cal. Nov. 30, 2005), *available at* http://www.usdoj.gov/atr/cases/f213400/213483.pdf; Plea Agreement, United States v. Hynix Semiconductor Inc., No. CR 05-249 (PJH) (N.D. Cal. May 11, 2005), *available at* http://www.usdoj.gov/atr/cases/f209200/209231.pdf; Plea Agreement, United States v. Infineon Techs. *AG*, No. 04-299 (PJH) (N.D. Cal. Oct. 20, 2004), *available at* http://www.usdoj.gov/atr/cases/f206700/ 206700.pdf; *cf.* Information, *United States v. Elpida Memory, Inc.*, No. CR 06-0059 (MMC) (N.D. Cal. Jan. 30, 2006), *available at* http://www.usdoj.gov/atr/cases/f214300/214342.pdf, http://www.usdoj.gov/atr/cases/f214300 /214342.wpd.

SDRAM technologies. In response to post-trial JMOL motions by Rambus, the court set aside the jury's verdict of fraud regarding the DDR SDRAM technology, but let stand the fraud verdict regarding the SDRAM technology.[80] The court then issued an injunction against Rambus and awarded attorney fees to Infineon. Both Rambus and Infineon appealed to the Federal Circuit.

In a 2-1 opinion, the U.S. Court of Appeals for the Federal Circuit vacated the JMOL of noninfringement and remanded the case for consideration under a revised claim construction.[81] In addition, the court reversed the denial of JMOL that had allowed the SDRAM fraud verdict to stand, holding that clear and convincing evidence did not support the implicit jury finding that Rambus breached a duty to disclose its patents or patent applications as required by JEDEC's rules. Finally, the Federal Circuit upheld the district court's decision to set aside the DDR SDRAM fraud verdict. These holdings rendered the injunction against Rambus moot, and required the Federal Circuit to vacate and remand the award of attorney fees for reconsideration.

Following remand, Infineon moved to compel production of various documents that Rambus was withholding on the basis of attorney-client and work product privileges. Specifically, the motion was a continuation of an earlier motion to compel under the "crime/fraud exception" to the attorney-client privilege. In ruling on the earlier motion, the district

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[80] Rambus, Inc. v. Infineon Techs. AG, 164 F. Supp. 2d 743 (E.D. Va. 2001).

[81] Rambus, Inc. v. Infineon Techs. AG, 318 F.3d 1081 (Fed. Cir. 2003).

court had concluded that "Rambus implemented a 'document retention policy,' in part, for the purpose of getting rid of documents that might be harmful in litigation."[82]

On May 18, 2004, the district court entered a second order compelling Rambus to produce additional documents.[83] Under this order, the court held that the crime/fraud exception extends to materials or communications created in planning, or in furtherance of, spoliation of evidence.[84] The court also found that Rambus's intentional destruction of documents was "an integral part of its licensing and litigation strategy."[85] The court then required Rambus to produce certain documents that Rambus had claimed were privileged, and allowed Infineon to conduct discovery on the appropriate sanctions for Rambus's behavior.[86]

In March 2005, at the conclusion of a bench trial, Judge Payne orally dismissed Rambus's patent claims against Infineon. The court found that Infineon had proven, by clear and convincing evidence, that Rambus possessed unclean hands and that Rambus had engaged in extensive spoliation of evidence.[87] Before Judge Payne issued a written opinion setting forth his findings, however, Rambus and In-

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[82] *See* Rambus, Inc. v. Infineon Techs. AG, 155 F. Supp.2d 668, 682 (E.D. Va. 2001).

[83] Rambus, Inc. v. Infineon Techs. AG, 222 F.R.D. 280 (E.D. Va. 2004).

[84] *Id.* at 290.

[85] *Id.* at 298.

[86] *Id.* at 299.

[87] *See* Samsung Elecs. Co. v. Rambus, Inc., 398 F. Supp. 2d 470, 473 (E.D. Va. 2005) (discussing Judge Payne's ruling).

fineon settled all of their pending litigation, including the case before Judge Payne.

As mentioned above, the *Infineon* litigation was only one of many actions involving Rambus and the major semiconductor companies. The other cases have yet to reach a resclution, but there have been some developments worth noting. In *Hynix Semiconductor, et al. v. Rambus Inc.*, the federal district court for the Northern District of California held a two-week trial on Hynix's unclean hands defense to Rambus's patent infringement claims. Judge Whyte issued an opinion on January 4, 2006, concluding that Hynix's defense failed, after finding that Rambus "did not engage in unlawful spoliation of evidence" and that "the evidence presented does not bear out Hynix's allegations that Rambus adopted its Document Retention Policy in bad faith."[88] On April 24, 2006, a jury found that Hynix had infringed Rambus's patents and awarded Rambus damages of $307 million.[89] On July 17, 2006, Judge Whyte granted summary judgment to Rambus on Hynix's claims based on breach of contract, promissory estoppel, and constructive fraud but denied summary judgment for Rambus on Hynix's claims based on al-

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[88] Hynix Semiconductor Inc. v. Rambus Inc., No. CV-00-20905 RMW, 2006 WL 565893, at *25, *28 (N.D. Cal. Jan. 5, 2006).

[89] *See* Special Verdict Form, Hynix Semiconductor Inc. v. Rambus Inc., No. CV-00-20905 RMW (N.D. Cal. Apr. 24, 2006), available at www.cand.uscourts.gov/cand/judges.nsf/bc83a5777591b96f88256d480060b73c/3db5d3212d350fc88825715a005f7b13/$FILE/00-20905.pdf. The court subsequently ordered a new trial on the issue of damages, but gave Rambus the option of accepting damages in the amount of $134 million. Hynix Semiconductor Inc. v. Rambus Inc., No. CV-00-20905 RMW, 2006 WL 1991760 (N.D. Cal. July 14, 2006).

legations of actual fraud.[90] The court also determined that "breach of the JEDEC disclosure policies, without more, cannot give rise to antitrust liability," but it ruled that "Hynix is not barred from asserting that Rambus's overall course of conduct, which may include the circumstances and intent behind its decision to not disclose its patents and patent applications, violated antitrust laws."[91] Hynix's remaining contentions that the patents are unenforceable have not yet been tried.

In *Micron v. Rambus*, currently pending in the U.S. District Court for the District of Delaware, a Special Master recently issued recommendations to the court on the disposition of Micron's motion to compel. Micron sought the production of certain privileged documents pursuant to the crime/fraud exception. In his report to the judge, the Special Master found that the exception did not apply, in part because there was no evidence of fraud. That finding, in turn, rested on an analysis of JEDEC's rules, similar to the analysis set forth in the Federal Circuit's *Infineon* decision.[92] The district court affirmed that analysis and conclusion, based on Virginia state fraud law.[93]

Finally, in *Samsung v. Rambus*, the U.S. District Court for the Eastern District of Virginia recently

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[90] Hynix Semiconductor Inc. v. Rambus Inc., No. CV-00-20905 RMW, 2006 WL 2038357, at *5-9 (N.D. Cal. July 17, 2006).

[91] *Id.* at *12.

[92] Special Master's Report and Recommendations on Motion of Micron Technology to Compel Defendant Rambus to Produce Certain Documents, Testimony and Pleadings, Micron Tech., Inc. v. Rambus Inc., CV-00-792-KAJ (D. Del. Mar. 6, 2006).

[93] Memorandum Order, Micron v. Rambus, CV-00-792-KAJ, 2006 WL 1653136 (D. Del. June 15, 2006).

concluded that Rambus had engaged in spoliation of evidence by destroying documents likely to be relevant at a time when Rambus anticipated or reasonably should have anticipated litigation.[94] Ruling in the context of Samsung's motion for an award of attorney's fees, the court found that Rambus planned for litigation throughout 1998 and 1999 and, "as part of the plan . . . implemented a pervasive document destruction program" that targeted "discoverable documents."[95] The court deemed the contrary ruling in *Hynix* "not persuasive."[96]

III. STANDARD OF REVIEW

We review the record *de novo* by considering "such parts of the record as are cited or as may be necessary to resolve the issues presented and . . . exercis[ing] all the powers which [the Commission] could have exercised if it had made the initial decision."[97] *De novo* review is particularly appropriate in this case because we must consider supplemental evidence, as well as new proposed findings of fact and conclusions of law, that were unavailable to the ALJ.[98] In light of our plenary review, we set aside all findings and conclusions of the ALJ, other than those that are expressly cited and relied upon.

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[94] Samsung Elecs. Co. v. Rambus Inc., No. 3:05-CV-00406-REP, 2006 WL 2038417 (E.D.Va. July 18, 2006).

[95] *Id.* at *42.

[96] *Id.* at *38.

[97] 16 C.F.R. § 3.54 (2005).

[98] The record was reopened on separate occasions after the Initial Decision to admit documents relating to Rambus's alleged spoliation of evidence and documents on Rambus's newly found backup tapes. *See supra* Section II.B.

A. Standard of Proof: The Preponderance of the Evdence Standard Applies in FTC Adjudications

FTC enforcement actions typically are governed by the preponderance of the evidence standard.[99] The Supreme Court has held that Section 7(c) of the Administrative Procedure Act (APA), which is applicable to administrative adjudicatory proceedings unless otherwise provided by statute, establishes "a standard of proof and . . . the standard adopted is the traditional preponderance-of-the evidence standard."[100] Furthermore, the preponderance of the evidence standard generally applies in civil suits to enforce federal statutes such as the antitrust laws.[101] Rambus acknowledges that the preponderance of the evidence standard applies in most agency adjudicatory proceedings, including FTC adjudications.[102] Nevertheless, Rambus advances four arguments why the Commission should apply the clear and convincing evidence standard in this matter.[103]

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[99] *See, e.g.*, In re Adventist Health System West, 117 F.T.C. 224, 297 (1994) ("Each element of the case must be established by a preponderance of the evidence"); FTC v. Abbott Laboratories, 853 F. Supp. 526, 535 (D.D.C. 1994) (government must show "by a preponderance of the evidence that [respondent's] action was the result of collusion with its competitors").

[100] Steadman v. SEC, 450 U.S. 91, 95-102 (1981) (considering standard of proof in SEC proceedings adjudicating alleged violations of the anti-fraud provisions of the securities laws).

[101] *See* Herman & MacLean v. Huddleston, 459 U.S. 375, 387-91 (1983).

[102] RB at 134.

[103] RB at 134-40.

1. Relationship between Patent and Antitrust Law in Cases Involving Fraud on the Patent Office or Patent Enforcement Initiated in Bad Faith

Rambus argues that "Complaint Counsel should bear the burden of proving the essential elements of their claims by clear and convincing evidence"[104] because of what it terms the "inherent tension between the patent and antitrust laws."[105] Rambus's attempt, however, to broaden the applicability of the clear and convincing evidence standard based on "inherent tension" between the patent and antitrust laws is unavailing. Patents are not inherently in tension with antitrust law. Patents do not necessarily create market power.[106] More fundamentally, competition and patent policy both are aimed at encouraging innovation that benefits consumers, and generally work well together in doing so.[107]

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[104] RB at 140.

[105] RB at 134.

[106] Ill. Tool Works, Inc. v. Indep. Ink, Inc., 126 S. Ct. 1281 (2006); *see also* U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY ¶ 2.2 (1995) [hereinafter IP GUIDELINES], *available at* http://www.ftc.gov/bc/0558.pdf.

[107] *See* Atari Games Corp. v. Nintendo of America, Inc., 897 F.2d 1572, 1576 (Fed. Cir. 1990) ("[T]he aims and objectives of patent and antitrust laws may seem, at first glance, wholly at odds. However, the two bodies of law are actually complementary, as both are aimed at encouraging innovation, industry and competition."); IP GUIDELINES, *supra note*, ¶ 1.0 (the patent and antitrust laws "share the common purpose of promoting innovation and enhancing consumer welfare"); FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, ch. 1 at 7-9 (2003) [hereinafter FTC INNOVATION REPORT], *available at* http://www.ftc.gov/os/2003/10/innovationrpt.pdf. When market power does result,

Nevertheless, Rambus suggests that two cases, in particular, support an extension of the clear and convincing standard to the facts in this proceeding. Neither case creates such a broad rule. The first case Rambus relies on is the Supreme Court's decision in *Walker Process Equipment v. Food Machinery & Chemical Corp.*[108] In *Walker Process,* the Supreme Court held that a patentee may be liable for violation of the antitrust laws if it enforces a patent obtained by knowing and willful fraud on the PTO, and if all other elements of a violation of Section 2 of the Sherman Act are established.[109] The rationale for this holding was to achieve "a suitable accommodation" between policies of the patent and antitrust laws by enjoining enforcement of a patent that conferred monopoly power when the patent was "procured by deliberate fraud."[110] Complaint Counsel in

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"Antitrust law recognizes that a patent's creation of monopoly power can be necessary to achieve a greater gain for consumers." *Id.* at 9. Correspondingly, "[T]he Patent Clause itself reflects a balance between the need to encourage innovation and the avoidance of monopolies which stifle competition without any concomitant advance in the 'Progress of Science and useful Arts.'" Bonito Boats, Inc. v. Thunder Craft Boats, 489 U.S. 141, 146 (1989) (quoting Article 1, Section 8 of the Constitution).

[108] 382 U.S. 172 (1965).

[109] *Id.* at 172, 175-77.

[110] *Id.* at 189-90 (J. Harlan, concurring); *see also id.* at 176; Nobelpharma AB v. Implant Innovations, Inc., 141 F.3d 1059, 1068-69 (Fed. Cir. 1998) (discussing the context in which the Supreme Court established the requirement of knowing and willful fraud). Subsequent cases established that, in *Walker Process* contexts, knowing and willful fraud on the PTO must be proven by clear and convincing evidence. *See* C. R. Bard, Inc. v. M3 Systems, Inc., 157 F.3d 1340, 1365 (Fed. Cir. 1998) (indicating that clear and convincing evidence is necessary because of "the ease with which routine patent prosecution may be por-

this case do not, however, allege that Rambus procured its patents through fraud on the PTO. Rather, it is alleged that Rambus manipulated the JEDEC standard-setting process by engaging in deceptive conduct, resulting in the unknowing adoption of standards that included Rambus's lawfully patented technologies.

Rambus's reliance on *Handgards, Inc. v. Ethicon, Inc.*[111] is similarly misplaced. The plaintiff there based a monopolization claim on allegations that the patentee pursued infringement actions in bad faith – with the knowledge that the patents, though lawfully obtained, were invalid.[112] To provide a "means whereby the bad faith infringement action can be identified post hoc with a sufficiently high degree of certainty," the court held that an infringement suit presumptively is filed in good faith, and that the presumption can be rebutted only by clear and convincing evidence.[113] The court acknowledged that the

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trayed as tainted conduct"); Caphote Corp. v. DeSoto Chemical Coatings, Inc., 450 F.2d 769, 772 (9th Cir. 1971) (justifying the clear and convincing evidence standard for finding *Walker Process* fraud on grounds of the "tortuous" road to the Patent Office and the complexity of patent litigation).

[111] 601 F.2d 986 (9th Cir. 1979).

[112] 601 F.2d at 986, 993-94 (noting that bad faith "is a subjective state of mind the existence of which, while not susceptible to certain proof, easily can spring from suggestive and weakly corroborative circumstances").

[113] *Id.* at 993, 996 (noting that the clear and convincing standard in *Walker Process* and *Handgards* is commensurate with the statutory presumption of patent validity, 35 U.S.C. § 282). *See* also CVD, Inc. v. Raytheon Co., 769 F.2d 842, 850 (1st Cir. 1985) ("a patentee who has a good faith belief in the validity of a patent will not be exposed to antitrust damages even if the patent proves to be invalid, or the infringement action unsuccessful"), *cert. denied*, 475 U.S. 1016 (1986).

clear and convincing standard is "not one intended to be utilized in antitrust litigation generally," and expressly limited its holding on the use of the clear and convincing standard to "proceedings in which the alleged violation of the antitrust law consists solely of one or more infringement actions initiated in bad faith."[114] This case, however, involves allegations of deceptive conduct in the context of SSO activities; Rambus is not accused of initiating infringement actions in bad faith.

In short, the cases cited by Rambus do not support its assertion that the clear and convincing standard applies to the elements of this antitrust case because it happens to involve a patent. The Commission is not charged with deciding whether Rambus committed fraud on the PTO, or whether Rambus initiated its infringement actions in bad faith. The issue in the case before the Commission is whether Rambus, through its participation in JEDEC and in the context of JEDEC's standard-setting processes, engaged in a deceptive course of conduct under Section 5 of the FTC Act.[115] No court has held that clear and convincing evidence is required to establish Section 5 de-

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[114] *Id.* Other cases cited by Rambus arose in similar contexts. *See* Loctite Corp. v. Ultraseal, Ltd., 781 F.2d 861, 876-77 (Fed. Cir. 1985) (requiring a clear and convincing showing that a plaintiff brought a patent infringement suit in bad faith, knowing that there was no infringement), *overruled on other grounds*, Nobelpharma AB v. Implant Innovations, Inc. 141 F.3d 1059, 1068 (Fed. Cir. 1998); *CVD*, 769 F.2d at 849-51 (requiring an antitrust plaintiff to prove bad faith assertion of trade secrets – with knowledge that no trade secrets existed – by clear and convincing evidence).

[115] *See, e.g.*, Complaint ¶¶ 2, 122-24.

ception.[116] To the contrary, as previously stated, the Supreme Court held that Section 7(c) of the APA establishes "a standard of proof and that the standard adopted is the traditional preponderance-of-the evidence standard."[117]

2. Standard of Proof Should Be Commensurate With Proposed Remedy

Rambus's second argument – that a heightened standard of proof is necessary because Complaint Counsel seek to bar enforcement of Rambus's patents under certain circumstances – in effect would allow one potential remedy to determine the standard for establishing whether a violation of the antitrust laws occurred. The potential remedy should not influence the standard of proof for liability.[118] To the extent

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[116] *See generally* FTC v. Algoma Lumber Co., 291 U.S. 67, 78-81 (1934) (holding that proof of fraud is not required to prove Section 5 deception).

[117] *See* Steadman v. SEC, 450 U.S. 91, 95-102 (1981).

[118] None of the cases cited by *Rambus* in its briefs support this contention. *See* CVD v. Raytheon Co., 769 F.2d 842 (1st Cir. 1985) (appeal to set aside jury verdict; no ruling that remedy sought should determine standard of proof); Livingstone v. North Belle Vernon Borough, 91 F.3d 515 (3d Cir. 1996) (action to determine voluntariness of an oral release-dismissal agreement that waived all civil claims in exchange for dismissal of criminal case; holding that "clear and convincing" evidentiary standard should apply in narrow context of evaluating voluntariness of oral release-dismissal agreements); Shepherd v. Am. Broad. Cos., Inc., 62 F.3d 1469 (D.C. Cir. 1995) (appeal of judicial sanctions; "clear and convincing" evidentiary standard not used to determine merits of the case); Lindahl v. Office of Personnel Management, 470 U.S. 768 (1985) (addressed issue of whether a federal worker may appeal an agency's denial of disability retirement claim to the Federal Circuit; no ruling that "clear and convincing" evidentiary standard should apply to determine merits of federal worker's underlying claim).

Rambus's arguments might be relevant to our consideration of particular remedies, we will address them in that context.

We note, however, that even a remedy barring enforcement of a patent does not necessarily require a heightened standard of proof. The equitable estoppel defense to patent infringement provides an example. A patentee's infringement claim may be barred if an alleged infringer establishes the elements of equitable estoppel (*i.e.*, misleading conduct, reliance, and material prejudice). The Federal Circuit has held that these elements ordinarily must be proven only by a preponderance of the evidence, noting that the clear and convincing standard applies to civil cases only when special circumstances are present.[119]

3. Chilling Participation in SSOs

We are unpersuaded by Rambus's third argument that a heightened burden of proof is necessary to avoid chilling procompetitive participation in standard-setting activities. This argument implicitly assumes that the usual burden of proof, if applied to antitrust claims involving SSOs, somehow will reduce incentives to engage in beneficial standard-setting activities. Rambus provides, and we find, no basis for that assumption.

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[119] *See* A.C. Aukerman Co. v. R.L. Chaides Constr. Co., 960 F.2d 1020, 1045-46 (Fed. Cir. 1992) (because no "special considerations are implicated by the defense of equitable estoppel as we defined it, we adopt the preponderance of the evidence standard in connection with the proof of equitable estoppel factors, absent special circumstances, such as fraud or intentional misconduct"). The antitrust case before the Commission does not entail the types of circumstances that have supported the requirement of clear and convincing evidence in other cases.

Rambus's argument ignores the potentially serious chilling effect of deceptive conduct in the SSO context. The Complaint alleged that Rambus deliberately sought to acquire a monopoly by using a standard-setting process to engage in patent hold-up. That conduct, if established, might itself chill participation in cooperative standard-setting activities.[120] The success of cooperative standard setting depends on some assurance that other participants will not exploit the process by acting deceptively.[121] Requiring a heightened burden of proof when analyzing deception in the SSO context would diminish that assurance.

4. Reliance on Testimony Rather than Contemporaneous Written Evidence

Rambus's fourth argument – that clear and convincing evidence should be required because Com-

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[120] *See, e.g.*, CX 2384 (letter from G. Kelley of IBM regarding a member's failure to disclose patents to JEDEC, stating: "I am and have been concerned that this issue can destroy the work of JEDEC. If we have companies leading us into their patent collection plates, then we will no longer have companies willing to join the work of creating standards"); Appleton, Tr. 6331-32 (if a company enforced a patent after failing to disclose it to JEDEC, it would "very much affect whether Micron participated [in JEDEC] or not"); Rhoden, Tr. 535-38 (Rambus's suits to enforce its patents relating to the JEDEC standards would cause "a fundamental shift away from open industry standardization"); Bechtelsheim, Tr. 5889 (if the "trust into the nature of an open standards process is violated, it makes it very difficult for me to rely on the standards groups developing standards").

[121] *Cf.* HERBERT HOVENKAMP ET AL., II IP AND ANTITRUST § 35.6 at 35-53 (Supp. 2003) (terming a standard-setting organization's desire "to make a fully informed decision on whether to adopt a particular standard" a "presumptively legitimate reason for requiring" disclosure of intellectual property).

plaint Counsel rely on "strained and faded memories"[122] – lacks both legal and factual support. Rambus has not identified a single judicial opinion to support its claim that delayed testimony triggers a heightened evidentiary standard, even though delayed testimony is hardly unusual in litigation. The absence of such opinions is unsurprising: the rule proffered by Rambus would reward defendants/respondents who engage in protracted deception and then foster pre-trial delays. In any event, Complaint Counsel in this case rely on contemporaneous documentary evidence in addition to the testimony of numerous witnesses. Many of Complaint Counsel's documentary exhibits are discussed throughout this Opinion.

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In sum, Rambus failed to establish a basis for the Commission to impose a heightened "clear and convincing" evidentiary standard to determine liability in this case. Rather, Complaint Counsel have the burden to prove the necessary elements of liability by a preponderance of the evidence, in keeping with the normal rules applicable in FTC adjudications.[123]

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[122] *See* RB at 140, RRB at 5.

[123] Although the ALJ rejected Rambus's proposed clear-and-convincing standard, he achieved much the same result by citing United States v. United States Gypsum Co., 333 U.S. 364 (1948), for the proposition that "where trial testimony is in conflict with contemporaneous documents, the trial testimony is entitled to little weight." *See Id. at* 264-65. *Gypsum* actually was considerably more limited. After noting that "counsel were permitted to phrase their questions in extremely leading form, so that the import of the witnesses' testimony was conflicting" and that the testimony dealt with whether known conduct had involved actions taken in concert, the Court ruled, "Where such

IV. MONOPOLIZATION CLAIM[124]

Section 2 of the Sherman Act makes it unlawful to "monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among

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testimony is in conflict with contemporaneous documents, we can give it little weight, particularly when the crucial issues involve mixed questions of law and fact." 333 U.S. at 395-96. The ALJ ignores *Gypsum*'s limits and misapplies its rule. We find no inconsistency between the documents and testimony sufficient to invoke broad usage of the rule in *Gypsum*.

The ALJ found the *Gypsum* rule "especially appropriate here, where witnesses would directly benefit from the outcome of this litigation because they work for companies that either manufacture or use DRAMS that may infringe Rambus's patents, work for entities that are entirely controlled by DRAM manufacturers, or are committed to developing technologies that will compete with Rambus's technologies." ID. at 265. This standard would call into question the utility and reliability of trial procedures in virtually all antitrust cases. In antitrust litigation, witnesses inevitably are "interested," in the sense that they represent one economic actor or another. In this proceeding, *both* Rambus's and Complaint Counsel's witnesses have an interest in the outcome; depreciating their evidence on that basis indicts all live witness testimony. Economic interest gives us no basis to find that trial procedures – such as requiring a foundation for evidence and subjecting witnesses to cross-examination – are inadequate to compile a reliable record. Therefore, absent a specific reason to question the credibility or reliability of a specific witness or a specific statement, we find no basis to discredit any of the testimony in the record.

[124] Because we find that Rambus unlawfully monopolized the four relevant markets delineated by Complaint Counsel (and whose definition was not contested by Rambus), we need not consider the further allegations that Rambus attempted to monopolize those markets or that Rambus's conduct otherwise constituted an unfair method of competition.

the several States, or with foreign nations . . . ."[125] The Supreme Court has identified the basic elements of the offense:

> The offense of monopoly under § 2 of the Sherman Act has two elements: (1) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident.[126]

The fundamental issues in this case are: (1) whether Rambus engaged in exclusionary conduct; (2) whether Rambus acquired monopoly power; and (3) whether there is a causal link between Rambus's conduct and its monopoly power. We consider each of these issues in turn.

A. Exclusionary Conduct

1. Framework for Analysis

From the earliest days of Section 2 jurisprudence, courts have held that unilateral conduct, absent an

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[125] 15 U.S.C. § 2. The Commission's authority under Section 5 of the FTC Act reaches conduct that violates the Sherman Act. *See, e.g.*, FTC v. Cement Inst., 333 U.S. 683, 694-95 (1948); Fashion Originators' Guild of America v. FTC, 312 U.S. 457, 463 (1941); Polygram Holdings, Inc., 5 Trade Reg. Rep. (CCH) ¶ 15,453 at 22,452 n.11 (FTC 2003), *available at* http://www.ftc.gov/os/2003/07/polygramopinion.pdf (slip op. at 13 n.11), *enforcement ordered*, Polygram Holding, Inc. v. FTC, 416 F.3d 29 (D.C. Cir. 2005).

[126] United States v. Grinnell Corp., 384 U.S. 563, 570-71 (1966); *see also* Verizon Communs., Inc. v. Law Offices of Curtis V. Trinko, 540 U.S. 398, 407 (2004) (terming the *Grinnell* formulation "settled law").

"anticompetitive" or "exclusionary" element, is benign – even if it creates or maintains monopoly power, or is dangerously likely to do so – because "the successful competitor, having been urged to compete, must not be turned upon when he wins."[127] As the Supreme Court noted in *Spectrum Sports, Inc. v. McQuillan*,[128] "[t]he law directs itself not against conduct which is competitive, even severely so, but against conduct which unfairly tends to destroy competition itself."[129]

Exclusionary conduct is "conduct other than competition on the merits – or other than restraints reasonably 'necessary' to competition on the merits – that reasonably appear[s] capable of making a significant contribution to creating or maintaining monopoly power."[130] Stated differently, if "a firm has been attempting to exclude rivals on some basis other than efficiency," it is engaging in exclusionary con-

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[127] United States v. Alcoa, 148 F.2d 416, 430-31 (2d Cir. 1945). *See also* Verizon v. Trinko, 540 U.S. at 407 ("To safeguard the incentive to innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive conduct.") (emphasis omitted).

[128] 506 U.S. 447 (1993).

[129] *Id.* at 458.

[130] III PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 651f, at 83-84 (2d ed. 2002). Several courts have relied on this definition. *See, e.g.*, Aspen Skiing Co. v. Aspen Highlands Skiing Corp., 472 U.S. 585, 605 n.32 (1985); Multistate Legal Studies, Inc. v. Harcourt Brace Jovanovich Legal & Prof'l Publ'ns, Inc., 63 F.3d 1540, 1550 (10th Cir. 1995), *cert. denied*, 516 U.S. 1044 (1996); Town of Concord v. Boston Edison Co., 915 F.2d 17, 21 (1st Cir. 1990), *cert. denied*, 499 U.S. 931 (1991).

duct.[131] The focus, at all times, is on harm to competition, not merely harm to competitors.[132]

The exclusionary element alleged here is that Rambus engaged in a course of deceptive conduct.[133] Complaint Counsel assert that Rambus created the misimpression that it was not seeking relevant patents, thereby misleading JEDEC members regarding the price of Rambus's technology and thwarting their ability to make informed choices. This sort of deceptive conduct is not competition on the merits. Just as "false or misleading advertising has an anticompetitive effect,"[134] distorting choices through deception obscures the relative merits of alternatives and prevents the efficient selection of preferred technologies.[135]

The courts have established that deception may constitute "exclusionary conduct" that will support a

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[131] *See Aspen Skiing*, 472 U.S. at 605 ("If a firm has been 'attempting to exclude rivals on some basis other than efficiency,' it is fair to characterize its behavior as predatory") (footnote omitted), quoting ROBERT H. BORK, THE ANTITRUST PARADOX 138 (1978).

[132] *See, e.g.*, Nynex Corp. v. Discon, Inc., 525 U.S. 128, 139 (1998) (requiring harm to "the competitive process"); *Town of Concord*, 915 F.2d at 21-22 (requiring harm to "the competitive process" such as by obstructing the achievement of lower prices, better products, or more efficient production methods); III AREEDA & HOVENKAMP, ANTITRUST LAW ¶ 651c, at 78-79.

[133] Complaint, ¶¶ 2, 122-24.

[134] *Cal. Dental Ass'n v. FTC*, 526 U.S. 756, 771 n.9 (1999).

[135] *Cf.* FTC v. Ind. Fed'n of Dentists, 476 U.S. 447, 461-62 (1986) (describing the anticompetitive consequences of "an effort to withhold (or make more costly) information desired by consumers for the purpose of determining whether a particular purchase is cost justified").

Section 2 claim in appropriate circumstances.[136] In *United States v. Microsoft*, for example, the United States Court of Appeals for the District of Columbia Circuit found that Microsoft's deception with respect to Java applications was exclusionary.[137] As discussion of the legal and factual circumstances and the nature of Rambus's conduct makes clear, proof of the deceptive conduct alleged in this case would establish the exclusionary element required by Section 2.

We stand on familiar ground when we evaluate whether Rambus engaged in a deceptive course of conduct. Section 5 of the FTC Act proscribes, *inter alia*, deceptive acts and practices, and accordingly, the Commission has developed special expertise to determine whether conduct is deceptive.[138] Lest there be any doubt as to the elements of deceptive conduct under Section 5, those elements were spelled out in the Commission's 1983 Policy Statement on Deception (Policy Statement),[139] which the courts have

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[136] *See* Conwood Co., LP v. U.S. Tobacco Co., 290 F.3d 768 (6th Cir. 2002) (maintaining monopoly power by, *inter alia*, providing misleading market data to retailers in order to distort their purchasing decisions violated Section 2); Caribbean Broad. Sys. Ltd. v. Cable & Wireless PLC, 148 F.3d 1080, 1087 (D.C. Cir. 1998); International Travel Arrangers, Inc. v. Western Airlines, 623 F.2d 1255, 1262-63, 1270 (8th Cir.), *cert. denied*, 449 U.S. 1063 (1980).

[137] *See* United States v. Microsoft Corp., 253 F.3d 34, 76-77 (D.C. Cir. 2001); *see also infra* Section IV.A.1.b. (discussing the *Microsoft* case).

[138] FTC v. Colgate-Palmolive Co., 380 U.S. 374, 391-92 (1965); *Kraft, Inc. v. FTC*, 970 F.2d 311 (7th Cir. 1992).

[139] Federal Trade Commission, *Policy Statement on Deception* (1983), *reprinted in* 4 Trade Reg. Rep. (CCH) ¶ 13,205 at 20,911-12 [hereinafter *Policy Statement*].

treated as the definitive description of those elements under the FTC Act.[140]

According to the Policy Statement, for conduct to be found deceptive, there must have been a "misrepresentation, omission or practice" that was "material" in that it was likely to mislead "others acting reasonably under the circumstances" and thereby likely to affect their "conduct or decision[s]." Thus, in order to determine whether conduct (including a course of conduct) is deceptive, we must consider "the circumstances" in which the alleged "misrepresentation, omission or practice" occurred. We analyze the legal circumstances, factual circumstances, and nature of the conduct itself in assessing Rambus's conduct.

a. Legal Circumstances

Because this is a monopolization case, Rambus's allegedly deceptive conduct ultimately must be analyzed under Section 2 of the Sherman Act.[141] That requires two modifications to the analysis articulated by the Policy Statement. First, under the Policy Statement, the respondent's state of mind is irrelevant in determining whether the respondent engaged in deceptive conduct under Section 5. Under Section 2, however, the defendant must act "willfully" in acquiring or maintaining monopoly power. Thus, for Rambus's allegedly deceptive course of conduct to be actionable under the Sherman Act, Rambus must

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[140] Novartis Corp. v. FTC, 223 F.3d 783 (D.C. Cir. 2000); *FTC* v. Pantron I Corp., 33 F.3d 1088 (9th Cir. 1994), *cert. denied*, 514 U.S. 1083 (1995).

[141] Whatever the potential breadth of Section 5 of the FTC Act in these circumstances, our analysis in this opinion rests on the traditional criteria for evaluating allegations of monopolization under Section 2 of the Sherman Act.

have acted "willfully," as opposed to inadvertently or even negligently.[142]

Second, the Policy Statement does not require proof of competitive harm for a respondent's conduct to be deemed deceptive under Section 5. However, under Section 2, in order to be condemned as "exclusionary," defendant's conduct must harm the competitive process, and that anticompetitive harm must outweigh the conduct's procompetitive benefits, if any.[143] Thus, for Rambus's alleged deceptive course of conduct to be actionable under Section 2, the conduct must have an anticompetitive effect that outweighs any procompetitive benefit.

Rambus argues that we should apply the "sacrifice test" as the framework for our analysis. That is, its conduct should be deemed exclusionary only if it would have been unprofitable to the defendant – if the defendant would have sacrificed profits – "but for" the expectation that the conduct would exclude rivals and permit the defendant to recoup its losses via the acquisition of long-run monopoly power.[144]

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[142] Some commentators have noted that the term "willful" often provides only limited guidance: "every firm 'willfully' maintains its profits or market share . . . ." III AREEDA & HOVENKAMP, ANTITRUST LAW, *supra* note , ¶ 651 at 76. They posit that courts often have "focused on conduct while talking about intent." *Id.* In the context of deceptive conduct, however, willfulness helps in determining "whether the challenged conduct is fairly characterized as 'exclusionary' or 'anticompetitive,'" Aspen Skiing, Co. v. Aspen Highlands Skiing Corp., 472 U.S 585, 602 (1985), by distinguishing intentionally deceptive conduct from conduct that, while misleading, is merely inadvertent or negligent.

[143] United States v. Microsoft Corp., 253 F.3d 34, 58-59 (D.C. Cir. 2001).

[144] RB at 110-12.

Stated more generally, the so-called sacrifice test condemns conduct that would not make "economic sense" but for the elimination or lessening of competition.[145] Rambus contends that keeping information about its patent applications secret and refusing to share that information with competitors was beneficial to Rambus, regardless of what happened at JEDEC, and therefore could not be exclusionary.[146] The ALJ concurred.[147] We believe this was error both as a matter of law and as a matter of fact.

As a matter of law, we recognize that the sacrifice test may be well-suited to certain types of Section 2 claims where the risk of interfering with vigorous competitive activity is heightened,[148] but the test is

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[145] *See* A. Douglas Melamed, *Exclusive Dealing Arrangements and Other Exclusionary Conduct – Are There Unifying Principles?*, 73 ANTITRUST L.J. 375, 389-403 (2006) (stating views of counsel for Rambus in this proceeding).

[146] RB at 113-15.

[147] *See* ID at 286-87, 289, 292.

[148] Some court decisions have employed the test's underlying concept in the context of predatory pricing. *See, e.g.*, Matsushita Elec. Indus. Co. v. Zenith Radio Corp., 475 U.S. 574, 588-89 (1986) (explaining that pricing below competitive levels entails forgoing profits and that, to make this rational, there must be a reasonable expectation of later recoupment through monopoly profits); Concord Boat Corp. v. Brunswick Corp., 207 F.3d 1039, 1062 (Cir. 2000); Conoco Inc. v. Inman Oil Co., 774 F.2d 895. 905-06 (8th Cir. 1985). Other court decisions have applied similar thinking to unilateral refusals to deal with rivals. *See, e.g.*, Morris Communications v. PGA Tour, 364 F.3d 1288, 1295 (11th Cir.), *cert. denied*, 125 S.Ct. 87 (2004); *cf.* Verizon Communs., Inc. v. Law Offices of Curtis V. Trinko, 540 U.S. 398, 409 (2004) (explaining that in the *Aspen Skiing* refusal-to-deal case, "[t]he unilateral termination of a voluntary (*and thus presumably profitable*) course of dealing suggested a willingness to forsake

not appropriate here. It misses conduct that reduces consumer welfare, but happens to be inexpensive to execute, and therefore does not involve a significant profit sacrifice. For example, defrauding the PTO in order to secure a patent that confers a monopoly demands little profit sacrifice, yet the Supreme Court has held that such fraud can violate Section 2.[149] Likewise, in this case, without reducing prices, forgoing sales, or even spending substantial funds beyond what it otherwise would have spent, Rambus's conduct may have imposed substantial costs on rivals and contributed significantly to the creation of monopoly power. In cases such as this, the *Microsoft* analysis – with its focus on determining "whether the monopolist's conduct on balance harms competition"[150] – is the proper lens for scrutinizing allegedly exclusionary conduct.[151]

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short-term profits to achieve an anticompetitive end") (emphasis original).

[149] *See* Walker Process Equipment, Inc. v. Food Mach. & Chem. Corp., 382 U.S. 172 (1965).

[150] *Microsoft*, 253 F.3d at 58-59.

[151] *See* Caribbean Broad. Sys. Ltd. v. Cable & Wireless PLC, 148 F.3d 1080, 1087 (D.C. Cir. 1998) (noting that anticompetitive conduct takes "many different forms" and is highly "dependent on context"). Although Rambus highlights FTC/DOJ support for the sacrifice test in various briefs, the agencies have made it clear that exclusionary conduct "need not always entail economic sacrifice." Brief of Amici Curiae United States & Federal Trade Commission on Writ of Certiorari at 11 n.2 (Dec. 2002), Verizon v. Trinko, 540 U.S. 398 (No. 02-682). Indeed, the agencies suggested a standard that would condemn conduct with harm to competition "disproportionate" to its benefits – along the lines of *Microsoft's* balancing test – for purposes of assessing opportunistic behavior in the standard-setting process. Brief of Amici Curiae United States & Federal Trade Commission at 14-15 (May 2003), *Trinko* (No. 02-682). The agencies

b. Factual Circumstances

The factual context in which the alleged conduct occurred is critical. For example, in *Microsoft*, the D.C. Circuit concluded that Microsoft violated Section 2 by making misleading statements to Independent Software Vendors (ISVs) in a context in which the ISVs reasonably could have expected that Microsoft would *not* mislead them. Specifically, Microsoft publicly committed to cooperate with Sun Microsystems (Sun), and also offered ISVs a set of "Java implementation tools" that ostensibly would enable them to develop cross-platform applications.[152] Thus, there was a reasonable expectation that the relationship between Microsoft and Sun and, more importantly, between Microsoft and the ISVs, would be characterized by cooperation, not deception. The record showed, however, that Microsoft sought to use unwitting ISVs to generate Windows-dependent applications that were incompatible with other platforms. To that end, Microsoft surreptitiously included in its implementation tools certain key words or directives that could be executed solely by Microsoft's version of the Java runtime environment for Windows.[153] In light of the expectations of a cooperative relationship, Microsoft's deceptive conduct was opaque. Consequently, countermeasures were hard, if not impossible, to implement, and there was a substantial threat of competitive harm.

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urged reserving the "sharper focus" provided by the sacrifice test for situations such as the refusal-to-aid-rivals claim presented in *Trinko*, for which antitrust interference was thought likely to offer "infrequent pro-competitive benefits" and "frequent anticompetitive risks." *Id.* at 15, 17.

[152] 253 F. 3d at 76.

[153] *Id.*

In contrast, deceptive conduct in competitive environments is less likely to be actionable under Section 2, because misrepresentations, deceptive practices, or omissions in the context of competitive relationships are less likely to be material. For example, we agree with the reasoning in two recent appellate cases finding that misleading statements in the advertising contexts there at issue were not grist for Section 2 claims.[154] Those decisions make sense in the "rough and tumble" of the competitive marketplace because the allegedly misleading hyperbole was transparent to rivals, who generally could protect themselves by engaging in their own counter-advertising. Therefore, there was a relatively low risk that significant anticompetitive effects would occur in that context.

Unlike those advertising cases, the very different circumstances presented here suggest that deceptive conduct could have caused lasting competitive harm by obscuring crucial information, known only to one industry member, until it was too late to counteract the consequences. In this context, we cannot stress too strongly the importance we place on the fact that the challenged conduct occurred in the context of a standard-setting process in which members expected each other to act cooperatively. We recognize that standard setting of the type sponsored by JEDEC potentially yields significant efficiencies[155] – especially

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[154] *See* Am. Council of Certified Podiatric Physicians & Surgeons v. Am. Bd. of Podiatric Surgery, 323 F.3d 366, 370-72 (6th Cir. 2003) (applying a rebuttable presumption that effect on competition of misleading advertising material was *de minimis*); Am. Prof'l Testing Services v. Harcourt Brace Jovanovich Legal & Prof'l Publ'ns, Inc., 108 F.3d 1147, 1152 (9th Cir. 1997) (same).

[155] *See* Moore v. Boating Indus. Ass'n, 819 F. 2d 693, 695 (7th Cir. 1987); *cf.* United States Dep't of Justice and Federal Trade

when the standards facilitate interoperability among various components, to the likely benefit of industry participants as well as consumers.[156] Although standard setting displaces the normal process of selection through market-based competition – by which, without any agreement, the purchasing decisions of customers determine which interoperable combinations of products and technologies ultimately will survive – the efficiency benefits of consensus standard setting easily can outweigh that loss of competition.

Even under the best of circumstances, however, the standard-setting process has a unique potential to skew the competitive process by aligning supply and demand in a prescribed direction.[157] The risk of competitive harm is heightened in the face of exclusionary conduct that does not constitute competition on the basis of efficiency and that interferes with the cooperative nature of the standard-setting process. Exclusionary conduct such as deception may distort the selection of technologies and evade protections designed by SSOs to constrain the exercise of monopoly power, with substantial and lasting harm to competition.[158] Additionally, unlike misleading statements

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Comm'n, Antitrust Guidelines for Collaborations Among Competitors (2000) *reprinted in* 4 Trade Reg Rep. (CCH) ¶ 13,160, *available at* http://www.ftc.gov/os/2000/04 /ftcdojguidelines.pdf.

[156] *See, e.g.*, Williams, Tr. 763; Calvin, Tr. 994; Polzin, Tr. 3972.

[157] *See* Standard Sanitary Mfg. Co. v. United States, 226 U.S. 20, 41 (1912); FTC Bureau of Consumer Protection, Standards and Certification Final Staff Report, at 28, 34 (April 1983); Michael Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSPECTIVES 93, 105-06 (1994); Richard Gilbert, *Symposium on Compatibility: Incentives and Market Structure*, 40 J. INDUS. ECON. 1 (1992).

[158] *See infra* Sections IV.C.1, IV.C.2, and IV.C.3.c., d.

made in advertising – which can be corrected quickly by a competitor's counter-advertising – there are fewer "quick fixes" available to correct the competitive harm caused by deception in the SSO context, once a standard has been chosen and the industry has become locked in. If exclusionary conduct reduces or destroys the efficiencies to be gained through consensus standard setting, it may cause considerable harm to competition. If the anticompetitive harm exceeds any remaining efficiencies, standard setting is no longer beneficial on balance.

Consequently, courts have scrutinized conduct related to standard setting.[159] For example, the Supreme Court has condemned efforts to bias the standard-setting process by "stacking" the decision making body with voters interested in excluding a competing product.[160] The Court also has recognized that the power to distort the interpretation of standards is the "power to frustrate competition in the marketplace."[161] Likewise, prior Commission enforcement efforts have targeted distortions of stan-

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[159] *See* Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 500 (1988) ("Agreement on a product standard, is after all, implicitly an agreement not to manufacture, distribute, or purchase certain types of products. Accordingly, private standard setting associations have traditionally been objects of antitrust scrutiny."); Am. Soc'y of Mech. Engineers, Inc. v. Hydrolevel Corp., 456 U.S. 556, 571 (1982).

[160] *See Allied Tube*, 486 U.S. at 508 ("petitioner was at least partially motivated by the desire to lessen competition and . . . stood to reap substantial economic benefits from making it difficult for respondent to compete"), 511.

[161] *See Am. Soc'y of Mech. Engineers*, 456 U.S. at 571.

dard-setting processes that have led to the creation of market power.[162]

Antitrust scrutiny of possibly deceptive conduct in the standard-setting context is especially warranted when the standard-setting body has determined to carry out its work in an environment ostensibly characterized by cooperation, rather than rivalry -- in other words, when the circumstances closely resemble those in *Microsoft* (as distinguished from the competitive environment in the Section 2 advertising cases mentioned above). In a consensus-oriented context, participants in the standard-setting process are likely to be less wary of deception; they are less likely to detect and take countermeasures to counteract it, and anticompetitive effects therefore are more likely to result. The magnitude of potential anticompetitive consequences may also be as substantial as it was in *Microsoft*, given the potential for a standard to create market or monopoly power.[163]

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[162] *See* Union Oil Co., Dkt. No. 9305, Decision & Order, ___ F.T.C. ___, 2005 WL 2003365 (2005), *available at* http://www.ftc.gov/os/adjpro/d9305/050802do.pdf (consent order resolving allegations that Unocal illegally had acquired monopoly power by misrepresenting to a state standard-setting board that certain research was non-proprietary while pursuing patent claims that would have enabled Unocal to charge royalties for low-emission gasoline compliant with the standard); Dell Computer Corp., 121 F.T.C. 616 (1996) (consent order resolving allegations that, after certifying that it had no relevant patents, Dell sought to enforce patents adopted by a standard-setting organization).

[163] *See* HOVENKAMP ET AL., II IP AND ANTITRUST, *supra* note , at § 35.5b at 35-43 (Supp. 2006) ("the competitive risk is that the misrepresentation [defined to include omissions] will cause a standard-setting organization to adopt a standard it otherwise would have rejected, and that the adoption of that standard will

We do not hold, and our decision should not be read to mandate, that all SSOs should require disclosure of relevant intellectual property. An SSO may choose not to require such disclosures. If, however, an SSO does require such disclosures, then non-disclosure – followed by adoption of a standard incorporating the intellectual property, and royalty demands against those practicing the standard – may be considered a material omission and may constitute deceptive conduct under Section 5. If an SSO chooses not to require such disclosures, SSO members still are not free to lie or to make affirmatively misleading representations. In either case, whether the SSO requires disclosure should be judged not only by the letter of its rules, but also on how the rules are interpreted by its members, as evidenced by their behavior as well as by their statements of what they understand the rules to be.

c. Nature of the Conduct

In order to assess fully the circumstances under which the alleged deception occurred, we also must understand the nature of the allegedly deceptive course of conduct, which combined the acquisition and exploitation of patents with a cooperative standard-setting process. A patent holder's market power may be materially enhanced once the patented technology is incorporated into a standard, as alternatives become less attractive relative to the chosen technology and less able to constrain its price.[164] For

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in turn confer on the defendant market power it would not otherwise have obtained.").

[164] *See* Dell Computer Corp., 121 F.T.C. 616, 624 (1996) (Statement of the Federal Trade Commission); McAfee, Tr. 7494-95.

this reason, Rambus's alleged course of conduct, if established, could be especially pernicious to the competitive process.

An SSO may elect to require disclosure of patent positions before standardization decisions are made, because this enables SSO participants to make their choices with more complete knowledge of the consequences – including the potential that those practicing the standard may be liable for patent infringement, unless they negotiate licenses and pay royalties. If the SSO members prefer a given technology, notwithstanding the prospect of royalties, they can vote to incorporate it into the standard. If, in light of likely royalty payments, members prefer an alternative technology, they can vote against inclusion of the patented technology.

Disclosure of potential patent liability also helps avoid the possibility of hold-up by enabling SSO participants to seek protection from excessive royalties "*ex ante*" – *i.e.*, before choosing which technologies to incorporate into the standard. For example, an SSO member expecting to sell products that conform to the standard, who gains knowledge of potential patent exposure, may have powerful economic incentives to negotiate a license *before* the technology becomes standardized, based on the lower, *ex ante* value of the patented technology.[165] Similarly, the owner of the

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[165] Complaint Counsel's economic expert sets out the basis for this reasoning in greater detail. *See* McAfee, Tr. 7260-75, 7294-7308; *see also* Brief Amicus Curiae of Economics Professors and Scholars at 6-7 (presenting the views of six university economists). Rambus's economic expert, Richard Rapp, has acknowledged that "[s]tandard setting has the potential to create market power and enhance the market value of a technology by reducing the number of close substitutes." Richard T. Rapp &

patented technology may prefer to offer an *ex ante* license – even at a lower *ex ante* rate – knowing that the other SSO participants otherwise might engage in a cost/benefit analysis and opt to standardize an entirely different technology. Indeed, under certain circumstances, members of an SSO may even collectively negotiate these types of *ex ante* licenses, without necessarily running afoul of the antitrust laws.[166]

In sum, standard setting can function as an efficient substitute for selecting interoperable technologies through direct competition. Rambus's course of conduct allegedly impaired these processes within JEDEC. Complaint Counsel argue that Rambus deprived other JEDEC members of information needed to make an efficient selection of the "best" technologies for SDRAM standards, based on an analysis of likely costs as well as benefits. Rambus's conduct also purportedly prevented other JEDEC members

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Lauren J. Stiroh, Testimony at FTC/DOJ Hearings Regarding Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy, at 2 (Apr. 18, 2002), *available at* http://www.ftc.gov/opp/intellect/020418rappstiroh.pdf. Rapp continued, "In the absence of knowledge about proprietary IP rights in the technologies under consideration, manufacturers may find themselves the victims of opportunism after the standard has been set." *Id.* at 5. (Rapp's testimony identified a number of conditions that he argued must be met for anticompetitive harm to occur. We quote his statements for their agreement with Complaint Counsel's general theory, not as representative of any concession that anticompetitive conduct occurred in this case.)

[166] *See* Chairman Deborah Platt Majoras, Recognizing the Procompetitive Potential of Royalty Discussions in Standard Setting, Remarks Before Standardization and the Law: Developing the Golden Mean for Global Trade (Stanford, Cal., Sept. 23, 2005), *available at* http://www.ftc.gov/speeches/majoras/050923stanford.pdf.

from avoiding exposure to monopoly pricing by securing commitments regarding future royalty rates at a time when alternative technologies still offered unblunted competition. Under the Policy Statement, these circumstances are relevant to our analysis of whether Rambus's course of conduct constituted deception in violation of Section 5 of the FTC Act. Under Section 2 case law, these circumstances suggest exclusionary conduct: deceptive behavior that hides the price of a patented technology is not "competition on the merits,"[167] and deception that thwarts informed choice is not competition on the "basis [of] efficiency."[168]

2. Rambus's Course of Conduct

Applying the analytical framework to the facts of this case, we first consider whether Rambus engaged in a course of conduct in its JEDEC activities that included potentially deceptive conduct – *i.e.*, "misrepresentations, omissions, or practices."[169] There is little room for dispute about what Rambus did, because much of the evidence in the record regarding Ram-

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[167] *See, e.g.*, Aspen Skiing Co. v. Aspen Highlands Skiing Corp., 472 U.S. 585, 605 n.32 (1985); Multistate Legal Studies, Inc., v. Harcourt Brace Jovanovich Legal & Prof'l Publ'ns, Inc., 63 F.3d 1540, 1550 (10th Cir. 1995), *cert. denied*, 516 U.S. 1044 (1996); Town of Concord v. Boston Edison Co., 915 F.2d 17, 21 (1st Cir. 1990), *cert. denied*, 499 U.S. 931 (1991).

[168] *See Aspen Skiing*, 472 U.S. at 605 ("If a firm has been 'attempting to exclude rivals on some basis other than efficiency,' it is fair to characterize its behavior as predatory") (footnote omitted), quoting ROBERT H. BORK, THE ANTITRUST PARADOX 138 (1978).

[169] *Policy Statement*, *supra* note , at 20,911-12.

bus's conduct came from Rambus's own documents and witnesses.[170]

Based on that evidence, we find that Rambus concealed the patent applications it filed, and the patents it obtained, until JEDEC had adopted its SDRAM and DDR SDRAM standards. Once those standards were adopted, Rambus abused their adoption by suing firms that practiced the standards for patent infringement. Rambus also used information derived from JEDEC meetings to develop a patent portfolio that would cover JEDEC's SDRAM standards – a practice which, although it may not be clearly "deceptive" standing alone, nonetheless facilitates hold-up in a cooperative standard-setting context.

The record reveals the following chronology of events.

a. The Chronology of Concealment

1991. JEDEC was in the early stages of work on the SDRAM standard[171] when Rambus attended its first JEDEC meeting and joined JEDEC in December

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[170] Of course, documents destroyed by Rambus might have provided additional details regarding Rambus's activities. *See infra* Section V.

[171] Fully synchronous DRAM initially was proposed to JEDEC in May 1991. IDF 297. Rambus's patented versions of two of the relevant technologies are included in the SDRAM standard: programmable CAS latency and programmable burst length. Rambus's patented versions of the other two relevant technologies – dual-edge clocking and on-chip PLL/DLL – were included in the next generation of SDRAM, called DDR-SDRAM. All of these technologies were considered for inclusion into the SDRAM standard.

1991.[172] Within a few days of that JEDEC meeting, Rambus's Executive Vice President (EVP), Allen Roberts, called Lester Vincent, Rambus's outside patent counsel, to speak with him about "patent deadlines"; Roberts also informed staff that a Rambus goal for the first quarter of 1992 was "patent filing."[173]

1992. Rambus engineer William Garrett represented Rambus at its first JEDEC meeting as a member in February 1992. Following the meeting, Garrett reported to his supervisors that SDRAMs were inevitable and that SDRAM could be standardized sooner than expected.[174] Shortly afterwards, on March 5, 1992, Rambus responded to the PTO's restriction requirement[175] by filing ten divisional applications, all claiming priority based on the 1990 filing date of the original '898 application.[176]

On March 25, 1992, EVP Roberts and outside counsel Vincent discussed the steps Rambus would need to take to be in a position to accuse manufacturers of JEDEC-compliant SDRAM of infringement.[177]

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[172] CX 602 at 1-3. Rambus already had met with a number of DRAM manufacturers in an effort to convince them to license RDRAM. *See supra* Section II.A.

[173] CX 1705 at 34.

[174] CX 672 at 1 ("SDRAMs will happen.").

[175] *See supra* note and accompanying text.

[176] The patents that Rambus has asserted against SDRAM and DDR SDRAM manufacturers each derive from continuations of the '898 application or from continuations of one of these divisional applications. *See supra* Section II.A; IDF 171; Nusbaum, Tr. 1511-12.

[177] According to Vincent's notes, Roberts told Vincent with regard to JEDEC that Rambus "need[s] preplanning before accus[ing] others of infringement." CX 1941 at 1.

Two days later, Roberts and Richard Crisp (an engineer who served as Rambus's primary JEDEC representative from May 1992 until Rambus withdrew from JEDEC membership)[178] met with Vincent again to discuss Rambus's patent position as a member of JEDEC. Vincent advised both Roberts and Crisp that "there could be [an] equitable estoppel problem if Rambus creates an impression on JEDEC that it would not enforce its patent or patent appln [application]," but that the case would be "less clear cut if Rambus is merely silent."[179]

Early in April 1992, Crisp requested and received from Vincent abstracts of Rambus's current patent applications.[180] In April 1992, Crisp attended a JEDEC task group meeting that focused on SDRAMs. Reporting back to Rambus executives on the meeting's events, Crisp discussed the technologies under consideration, stressed the JEDEC members's concern with price, and concluded that "the group is pretty set on using the SDRAMs."[181]

On May 2, 1992, Roberts met with Vincent to discuss claims that Crisp wanted to add to Rambus's patent applications, including a claim covering pro-

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[178] Crisp, Tr. 2929.

[179] CX 1942. Equitable estoppel is a defense against infringement under patent law. It generally means that, if a patent holder's actions justify a belief that he has no intent to enforce the patent, then he is prevented (*i.e.*, equitably estopped) from enforcing the patent at a later date. *See, e.g.*, Stambler v. Diebold, 11 U.S.P.Q.2D (BNA) 1709 (E.D.N.Y. 1988). Vincent also advised that Rambus would be better able to defend against an equitable estoppel claim if Rambus abstained from voting at JEDEC. CX 1942.

[180] CX 1945 at 1; Crisp, Tr. 3050.

[181] CX 1708.

grammable latency and, if needed, a claim involving programmable burst length – two technologies eventually incorporated into the SDRAM standard.[182] After attending a JEDEC meeting later that month, Crisp spoke with Vincent to discuss adding claims to the divisional applications.[183] In that same month, Rambus CEO Tate called a meeting with Rambus executives, including Crisp and Roberts, to discuss: (1) how JEDEC SDRAMs might infringe Rambus's patents ("What patents do synchronous DRAMs violate of ours?"); (2) how Rambus might add claims to cover JEDEC standards ("What extensions should we be filing to add claims based on original inventions?"); and (3) the nature of Rambus's disclosure duties to JEDEC ("What obligation do we have to advise JEDEC that we have filed but unissued patents that sync do/may infringe?").[184]

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[182] CX 1946; Crisp, Tr. 3057-58. Vincent's notes state "Add claims to mode register to control latency output timing depending upon clock – specify clock cycle" and "check whether original application has blocks . . . (?)." The latter is a reference to programmable burst length. *See* Horowitz, Tr. 8661-62 (stating that he uses "variable block size" and "variable burst length" interchangeably); Geilhufe, Tr. 9642-43 ("variable block size" and "programmable burst length" are "[d]ifferent terms describing the exact same function"). Crisp was unable "at this point in time" (*i.e.*, at trial) to remember what the reference – misread to him by trial counsel as "blocks" – dealt with, but he acknowledged that he was "unsure whether we had claims in that area" and that he had "suggested to Mr. Roberts that if we didn't, we should have some claims in those areas, including blocks." Crisp, Tr. 3059.

[183] CX 34 at 1, 59; CX 1947.

[184] *See* CX 5101 (Tate e-mail, asking questions under the heading "JEDEC").

In June and July 1992, members of the JC 42.3 subcommittee, including Rambus, voted on whether the SDRAM standard should include a programmable mode register to set CAS latency and burst length.[185] The ballot asked the representative of each voting member whether he or she was aware of any relevant patents.[186] The ballot also asked members voting against the proposal to explain their reasons and asked specifically about any patent issues. IBM, which voted against the proposal, noted that "patent issues need to be cleaned up before we proceed."[187] Rambus omitted to disclose the existence of any pending or issued patents,[188] even though Rambus was working on claims relating to the mode register, programmable latency, and burst length at the time.[189] Rambus voted against the proposal, citing technical reasons (*e.g.*, an inadequate number of power pins).[190]

One week after the June 1992 ballot was circulated, Rambus CEO Tate forwarded to the firm's executives a "specific" business plan that outlined a patent strategy regarding SDRAMs:

> [W]e believe that Sync DRAMs [SDRAMs] infringe on some claims in our filed patents, and that there are additional claims we can file for our patents that cover features of Sync DRAMs. Then we will be in position to request patent li-

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[185] CX 252a.

[186] *Id.* at 2.

[187] JX 13 at 9.

[188] *Id.*

[189] *See* CX 1946; CX 1947.

[190] Crisp, Tr. 3080; JX 13 at 9.

> censing (fees and royalties) from any manufacturer of Sync DRAMs. Our action plan is to determine the exact claims and file the additional claims by the end of Q3/92. Then to advise Sync DRAM manufacturers in Q4/1992.[191]

In August 1992, Rambus specifically assigned JEDEC representative Crisp responsibility for overseeing development of amended patent claims to "provide better coverage" against SDRAMs.[192] Crisp followed up with outside counsel Vincent regarding the status of the planned amendments.[193] In September 1992, Crisp requested that Vincent file an amendment adding claims relating to "DRAM - multiple open row addresses" and "DRAM - programmable latency via control reg" to Rambus's pending applications.[194] Crisp requested these additional claims to "cause problems with synch DRAM."[195] Crisp agreed to provide Vincent with a copy of the "synch DRAM spec."[196] Crisp and Vincent also discussed adding claims relating to on-chip PLLs on DRAMs, in response to a formal presentation at JEDEC.[197] In November 1992, Crisp met with Vincent to follow up on claim amendments and received copies of Ram-

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[191] CX 543a at 14-17 (Rambus 1992-97 Business Plan, devoting a majority of discussion of competition to SDRAM).

[192] *See* CX 5104 at 1 (Rambus CEO Tate's "Notes from 8/26 Strategy Meeting" stating, "Richard [Crisp] will work to add modifications to our patents to provide better coverage, if possible, for Masters and against Ramlink/Sync DRAMs.").

[193] *See* Crisp, Tr. 3087-88; CX 1930 at 42.

[194] Crisp, Tr. 3097, 3099-3100; CX 1949.

[195] CX 1949 at 1.

[196] *Id.* at 4.

[197] *Id.* at 1, 5-7.

bus's pending patent applications.[198] A December 1992 Rambus planning document noted intentions to "get a copy of the SDRAM spec and check it for features we need to cover as well as features which violate our patents."[199]

1993. In January 1993, Rambus CEO Tate scheduled an "Objectives meeting" to discuss, among other things, "patents – vs. SDRAM."[200] In February 1993, per Crisp's instructions, Rambus worked on adding claims relating to programmable latency and on-chip PLL/DLL.[201] The following month, the JC 42.3 subcommittee voted to send its proposed SDRAM standard, which included programmable CAS latency and burst length, to the JEDEC Council for approval.[202]

On May 17, 1993, while the proposed SDRAM standard was awaiting final approval by the JEDEC Council, Rambus filed a preliminary amendment to another of its divisional applications.[203] Rambus engineer Fred Ware shortly afterwards described the amendment, which involved programmable CAS la-

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[198] CX 682; CX 1930 at 59; CX 1951 at 1.

[199] CX 1821 at 24.

[200] CX 5106.

[201] CX 686; Crisp, Tr. 3121-22 (explaining that Crisp provided Rambus engineer Fred Ware with a list of possible claim amendments including "DRAM with programmable access latency . . . [and] DRAM using PLL/DLL circuit to reduce input buffer skews"). Crisp and Vincent continued to communicate regarding patent application amendments during the following months. *See* CX 1930 at 83; CX 1957.

[202] IDF 351; JX 15 at 14.

[203] CX 1456 at 198-210 (amending Patent Application No. 07/847,651).

tency, as "directed against SDRAMs."[204] Crisp agreed.[205]

One week after Rambus filed its amendment, on May 24, 1993, the JEDEC Council formally adopted the SDRAM standard.[206] The SDRAM standard incorporated programmable CAS latency and programmable burst length, two of the technologies that Rambus claims are covered by its patents.[207]

After the SDRAM standard was adopted, the JC 42.3 subcommittee turned to work on the next generation of SDRAM, which became DDR SDRAM.[208] At the same time, Rambus continued to amend its patent applications to cover JEDEC-compliant products. In June 1993, Rambus engineers worked with Vincent to amend Rambus's patent applications with claims specifically directed against SDRAMs or future SDRAMs.[209] On June 18, 1993, an e-mail from Ware to Crisp and others noted that a claim for "DRAM with PLL clock generation" that was "directed against future DRAMs" was "partially written

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[204] CX 1959 (June 18, 1993 Ware e-mail); Crisp Tr. 3153-56. Years later, in preparation for Micron's litigation against Rambus, Ware examined the preliminary amendment and concluded that the scope of the claims was not as broad as he originally had thought. CX 2103 (Ware *Micron* Dep.) at 100 (*in camera*).

[205] CX 703.

[206] IDF 354-356.

[207] IDF 355; JX 56 at 114.

[208] *See, e.g.*, Rhoden, Tr. 460-63, 1200; Williams, Tr. 820; Sussman, Tr. 1402, 1429; G. Kelley, Tr. 2567, 2585-87.

[209] *See* CX 1959.

up" and needed to be finished and filed.[210] Crisp responded that this "sounds really good [and] matches what I have requested and what I believe has happened."[211]

1994. Rambus executives continued to correspond and meet with Vincent in early 1994 to "talk about patent strategies."[212] In March 1994 Rambus President David Mooring called for an "IP maximization strategy" to be put in place by the next quarter.[213]

Throughout 1994, Rambus continued to work on amending its applications, focusing on SDRAMs or future SDRAMs such as DDR. In May of that year, Roberts requested that Vincent consider ways to add or strengthen claims covering programmable CAS latency and dual-edged clocking, which subsequently became features of DDR SDRAM.[214] Rambus CEO Tate monitored the progress of Rambus's patent activity and asked for progress reports, particularly regarding the claims "that read directly on current/planned sdrams."[215]

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[210] CX 1959. *Compare* Nusbaum, Tr. 1584 *with* Fliesler Tr. 8867 (disagreeing as to whether claims filed on June 28, 1993 actually covered a subsequent PLL proposal).

[211] CX 703.

[212] CX 718 (e-mail dated January 5, 1994, setting up meeting with Vincent for January 12, 1994).

[213] CX 726 (e-mail dated March 15, 1994). Mooring's e-mail also proposed that Rambus "kick-off another patenting spree focused on the controller side of things" to take advantage of "a window of opportunity left while we still have confidential information . . . ." *Id.*

[214] CX 734.

[215] CX 740 (June 1994 e-mail from Tate to Roberts requesting "a list of which claims we are making that read directly on cur-

In September 1994, JEDEC participants made formal presentations relating to on-chip PLL/DLL technology for later-generation SDRAM (which became known as DDR SDRAM).[216] Although Crisp knew that Rambus had been pursuing patent claims covering on-chip PLL, he omitted to disclose any patents or patent applications at this meeting.[217] His report to Rambus management on the meeting stated, "Obviously we need to think about our position on this for potential discussion with NEC regarding patent issues here."[218] Crisp e-mailed Roberts that he thought Rambus eventually would bring infringement actions in areas such as "PLL on a DRAM . . . programmable access latencies and host of other areas."[219] In that same month, September 1994, Rambus amended its 08/222,646 application (the '646 application) to add claim 151, relating to dual-edged clocking.[220]

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rent/planned sdrams and on what most might be, so i can track progress from lester's [Vincent's] periodic status lists").

[216] At the JC 42.3 meeting on September 13-14, 1994, NEC made a presentation that proposed "putting a PLL on board their SDRAMs to improve the output delay." CX 711 at 36. This presentation led Crisp to conclude that "others are seriously planning inclusion of PLLs on board SDRAMs." *Id.* at 37.

[217] Crisp, Tr. 3316.

[218] CX 711 at 36.

[219] CX 757 at 1. A few weeks later, another Crisp e-mail to Rambus executives described on-chip PLL as "one of our key technology patents" and emphasized, "If it is allowed, we need to be able to collect on it." CX 763. *See also* CX 766 (October 1994 Crisp e-mail suggesting a strategy for encouraging "the SDRAM boys" to make use of on-chip PLLs so that Rambus could then sue them for infringement).

[220] CX 1493 at 183-85. *Compare* Nusbaum, Tr. 1597-98 *with* Fliesler, Tr. 8858 (both observing that claim 151 involved receiv-

1995. In April 1995, Rambus CEO Tate reiterated objectives of "get[ting] royalties from competitive memory" that used just one or a few of Rambus's technologies; called for verification that "all ideas we have requested to be filed as general patents re [SDRAM] have been [filed]"; and directed that Rambus "hold on patent issuances till then."[221] In May 1995, Crisp recommended that Rambus continue to keep its patent position secret, explaining that "it makes no sense to alert them [JEDEC] to a potential problem they can easily work around."[222] Through the summer, Crisp participated in work "on enhancing claim coverage."[223] In October 1995, Rambus amended one of its patent applications to insert claims relating to on-chip PLL/DLL technology.[224] One week after filing these amendments, Rambus received a JC 42.3 survey ballot on "Future Synchronous DRAM Features." The ballot asked whether members believed that "on chip PLL or DLL is important to reduce the access time from the clock for future generations of SDRAMs," and whether "future generations of SDRAMs could benefit from using BOTH edges of the clock for sampling inputs."[225] Rambus did not vote, and it failed to disclose the ex-

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ing data in response to both the rising and falling edges of a clock signal but disagreeing as to further implications). Roberts previously had circulated to Rambus executives drafts of the claim amendments, which Roberts described as "[Lester Vincent's] attempt to work the claims for the MOST/SDRAM defense." CX 746 at 1.

[221] CX 5110 at 2-3.

[222] CX 711 at 73.

[223] CX 5112.

[224] IDF 963; CX 1502 at 233-39.

[225] CX 260 at 12 (emphasis original); JX 28 at 45.

istence of any application that related to either on-chip PLL/DLL or dual-edge clocking.[226] At the meeting at which the ballot results were discussed, JEDEC member MOSAID disclosed that it had applied for a patent applicable to PLLs/DLLs; Crisp acknowledged that "even after seeing this disclosure of a patent application," he "did not say anything with respect to any Rambus patent application concerning PLLs or DLLs."[227]

Crisp advised management in September 1995 that Rambus should "redouble [its] efforts to get the necessary amendments completed, the new claims added and make damn sure this ship is watertight before we get too far out to sea."[228] In fall 1995, Rambus's new in-house counsel, Anthony Diepenbrock, outlined Rambus's patent strategy at a company-wide retreat.[229] Diepenbrock's presentation described Rambus's "offensive" patent strategy as "find[ing] key areas of innovation in our IP that are essential to creating a competing device" and "claim[ing] these areas as broadly as possible within the scope of what we invented."[230] The first two examples cited in Diepenbrock's presentation were DLLs and dual-edge clocking.[231]

Meanwhile, Diepenbrock advised Crisp – just as Vincent had in 1992 – that Rambus faced a risk of

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[226] Crisp, Tr. 3341; JX 28 at 45 (listing firms that provided responses).

[227] Crisp, Tr. 3341-44. Crisp promptly reported MOSAID's disclosure to Rambus management. *See* CX 711 at 192.

[228] CX 837 at 2.

[229] Diepenbrock, Tr. 6129-30.

[230] CX 1267; Diepenbrock, Tr. 6131.

[231] CX 1267; Diepenbrock, Tr. 6132-33.

equitable estoppel based on its participation in JEDEC.[232] Diepenbrock urged that Rambus withdraw from JEDEC.[233] At his next JEDEC meeting, in December 1995, Crisp made private inquiries regarding JEDEC's patent policy.[234] Based on these discussions, as summarized in an e-mail to Rambus executives, Crisp stated that it was unacceptable "to not speak up when we know that there is a patent issue, to intentionally propose something as a standard and quietly have a patent in our back pocket we are keeping secret that is required to implement the standard and then stick it to them later (as WANG and SEEQ did)."[235]

Later that month, Vincent sent Diepenbrock "materials relating to the proposed [FTC] consent order involving Dell computer," which resolved allegations of unfair methods of competition based on Dell's assertion of patent rights after its representative had certified to an SSO that a standard under consideration did not infringe any Dell patents.[236] Vincent's notes from the period conclude that there should be

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[232] Crisp, Tr. 3442.

[233] *Id.* at 3442-43.

[234] *Id.* at 3440-44, 3447-48; CX 711 at 188 (Crisp e-mail describing conversations with Sanyo's Howard Sussman and VLSI Technology's Desi Rhoden). Crisp testified that he sought this information because Rambus was considering making a presentation regarding a proposed technology. Crisp, Tr. 3440-41, 3447-48.

[235] CX 711 at 188. Crisp's e-mail adds, "I am unaware of us doing any of this or of any plans to do this." *Id.*

[236] CX 1990. *See* Dell Computer Corp., 121 F.T.C. 616 (1996).

"no further participation in any standards body . . . do not even get close!!"[237]

1996. On January 11, 1996, Vincent met with Rambus executives – including Tate, Crisp, and Diepenbrock – to discuss *Dell* and other matters.[238] Rambus attended no JEDEC meetings after this date.[239] According to Crisp, Rambus was concerned that attendance at future meetings could leave Rambus in a vulnerable position in future litigation.[240]

During this period, however, Rambus continued to build its patent portfolio. On October 6, 1995, the PTO had sent Rambus's attorney a notice of allowability on the '646 application, which had claims relating to dual-edged clocking.[241] According to Diepenbrock, this meant that "the patent office has reason to believe or believes that the claims should go to issuance."[242] Rambus paid the issuance fee on January 5, 1996, and the ensuing patent, No. 5,513, 327 ("the '327 patent") issued on April 30, 1996.[243] Issuance of this patent was a noteworthy event within Rambus.[244]

On June 17, 1996, Rambus sent a letter to JEDEC, signed by Crisp, stating that Rambus was not renew-

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[237] CX 1928 (emphasis original).

[238] CX 3126 (Vincent *Infineon* Dep.) at 536-38 (*in camera*).

[239] Rambus Answer, ¶ 41.

[240] CX 858 at 2 ("the current plan is to go to no more JEDEC meetings due to fear that we have exposure in some possible future litigation"); Crisp, Tr. 3358.

[241] CX 1482; Diepenbrock, Tr. 6190. *See supra* note 220.

[242] Diepenbrock, Tr. 6151.

[243] *Id.* at 6185, 6192; CX 1494.

[244] Diepenbrock, Tr. 6194.

ing its membership.[245] Rambus enclosed "a list of Rambus U.S. and foreign patents" and stated that "Rambus has also applied for a number of additional patents in order to protect Rambus technology."[246] The letter emphasized that "Rambus reserves all rights regarding its intellectual property."[247] Rambus omitted from the list that it provided to JEDEC the only then-issued patent that Rambus believed covered technology under consideration by JEDEC – the '327 patent.[248]

Rambus's June 1996 withdrawal letter also omitted information that would have allowed JEDEC members to adopt standards that would avoid infringing Rambus's intellectual property. While the letter mentioned inconsistency between JEDEC and Rambus with respect to the "terms" of licensing, and purported to reserve Rambus's rights respecting its intellectual property, Rambus omitted to disclose that it had used information gleaned during JEDEC meetings to develop a patent portfolio covering JEDEC's SDRAM and DDR SDRAM standards, and also omitted to disclose the patent applications Rambus had filed to implement its strategy. To the contrary, the letter stated, "To the extent that anyone is interested in the patents of Rambus, I have enclosed a list of Rambus U.S. and foreign patents."[249] Rambus's list

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[245] CX 887.

[246] *Id.*

[247] *Id.*

[248] *See* CX 5013 (designated R401208-09) (Joel Karp presentation regarding "Enforcement Scenario for 1999," stating, "'327 – covers DDR (dual-edged clocking)"). (The "R" designation refers to Bates stamp numbers that appear on this and other exhibits admitted into this record from the *Infineon* litigation.)

[249] CX 887.

identified *only* patents unrelated to JEDEC's work.[250] Rambus's letter stated that Rambus had applied for "a number of additional patents" but the letter did not suggest that future patents would be any more applicable to JEDEC's DRAM standards than were the issued patents on the list.

1997 and subsequent years.[251] Although Rambus terminated its JEDEC membership in 1996, Rambus continued to receive information on the activities of

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[250] Although some of the listed patents derived from the '898 application, none of them applied to JEDEC's SDRAM and DDR SDRAM work, Jacob Tr. 5365-66, 5501-02, and none was named in Rambus's infringement complaints or counterclaims against DRAM manufacturers. *Compare* CX 887 at 2 (Rambus's list of issued patents) *with* CX 1855 (complaint against Hitachi), CX 1867 (complaint against Infineon), CX 1878 at 13-14 (counterclaims against Hyundai), CX 1891 at 2 (claims asserted against Hyundai/Hynix), *and* CX 1880 at 29-38 (counterclaims against Micron).

[251] By including herein a discussion of Rambus's post-resignation conduct, we do not mean to suggest that a firm that never participated in a standard-setting process – or that did so without deception, then resigned from the SSO – would be at risk of Section 2 liability if it monitored the standard-setting process from the outside and developed a patent portfolio covering standards it believed would be adopted. Rambus's post-resignation conduct was quite different. It represented the continuation, albeit in a different form, of a deceptive course of conduct that began more than four years before Rambus formally "resigned" from JEDEC. Rambus's "resignation" did nothing to cure its prior course of conduct. If anything, the resignation operated to conceal further Rambus's course of conduct, because Rambus's resignation letter left the impression that Rambus had disclosed what was relevant when, in fact Rambus had done nothing of the sort. Under these circumstances, treating Rambus's post-resignation conduct as benign could invite further abuses of standard-setting processes that otherwise might be procompetitive.

JEDEC after 1996. Beginning in 1997, Crisp received information from a source that he referred to as "deep throat."[252] Crisp also received information from three other unsolicited sources known as "Mixmaster," a reporter called "Carroll Contact," and "secret squirrel."[253] According to Crisp, these sources provided information on the features of devices being proposed for standardization.[254] Crisp shared the information he obtained from these inside sources with Rambus's executives and engineers,[255] and this information was used in the continuing process of filing and amending Rambus's patent applications.[256]

Additionally, although no longer a JEDEC member, Rambus continued to conceal its relevant patent applications. Rambus CEO Tate, for example, stated in a February 1997 e-mail to Rambus executives, "do *NOT* tell customers/partners that we feel DDR may infringe – our leverage is better to wait."[257] Likewise, a July 1997 e-mail by Rambus Chairman of the Board Bill Davidow stated that "[o]ne of the things we have avoided discussing with our partners is intellectual property problem [infringement by SyncLink and SDRAM/DDR SDRAM] . . . . We are hoping that they will either drop their competitive efforts or

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[252] CX 929; CX 932.

[253] IDF 280-81; Crisp Tr. 3412-18.

[254] Crisp Tr. 3417.

[255] CX 935 at 1; CX 929 at 1; CX 973 at 1; CX 979 at 1; CX 1014 at 1.

[256] Crisp Tr. 3418. *See generally* CX 5115 (November 1996 Tate e-mail announcing plans for an "IP strategy" panel to discuss Rambus efforts to use intellectual property "in process" to "block . . . SDRAM-2 . . . .").

[257] CX 919.

discover for themselves that they have violated Rambus patents and will conclude that getting around them will be either extremely difficult or impossible and will take a lot of time."[258] And in its October 1998 "strategy update," Rambus stated, "We should not assert patents against Direct partners until ramp reaches a point of no return."[259] In sum, after leaving JEDEC, Rambus strategically maintained its silence, thereby prolonging the misimpression created by its prior conduct.

By March 1998, a DDR SDRAM standard incorporating all four of the technologies that Rambus claims are covered by its patents had been approved by the JC 42.3 committee.[260] The JEDEC Council approved that standard, and it was published as a JEDEC standard in August 1999.[261] By November 1999, Rambus had obtained all four patents cited in its first complaint against JEDEC-compliant uses (filed against Hitachi) in January 2000.[262]

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[258] CX 938 at 1.

[259] CX 5011 at 3 (designated R401155).

[260] IDF 380; JX 40 at 7-8; CX 375.

[261] IDF 381; CX 234.

[262] CX 1855. Rambus followed this initial suit with a complaint against Infineon, filed in August 2000, CX 1867, and with counterclaims against Hyundai/Hynix, CX 1878, and Micron, CX 1880, filed in February 2001, all alleging infringement based on JEDEC-compliant uses. Rambus quickly induced other industry members to enter licenses covering production of JEDEC-compliant products. *See* CX 1391a at 8 (November 2000 Tate "Big Picture Update," stating that more than 40% of the "SDRAM/DDR market" had already accepted Rambus licenses); CX 1154 (November 2000 Tate e-mail noting that SDRAM/DDR SDRAM and RDRAM licenses already gave Rambus royalties from close to half of the entire DRAM market); CX 1689 (*in*

b. Rambus's "Notice" to JEDEC

Rambus claims that it twice gave notice to JEDEC of its patents and patent applications through responses to questions. Based on our review of the evidence regarding those incidents, we find that, far from giving notice, Rambus's responses were evasive and, indeed, misleading.

The first incident, in May 1992, was an outgrowth of concerns held by IBM and Siemens regarding possible Rambus patents on dual-bank designs. In the course of a discussion of that technology at a JEDEC meeting, some of the participants noted the possibility that Rambus and Motorola might have patents on multi-bank designs (a technology that is not at issue here).[263] Motorola's representative promised to check and to get back to JEDEC with an answer.[264] Expressing concern that Rambus might have a patent on multi-bank designs, and noticing that Rambus had stayed silent, Siemens's Meyer asked the DRAM task group chairman, Gordon Kelley of IBM, to pose a direct question to Rambus.[265] Kelley asked whether Rambus wanted to comment.[266] Rambus's represen-

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camera) (December 2000 SDRAM/DDR SDRAM license with Mitsubishi).

[263] *See* RX 297 at 4-5; CX 2089 at 133 (Meyer *Infineon* Trial Tr.) (*in camera*).

[264] *See* CX 2089 at 133 (Meyer *Infineon* Trial Tr.) (*in camera*).

[265] *See* CX 673; CX 2089 at 133, 164 (Meyer *Infineon* Trial Tr.) (*in camera*).

[266] *See* Crisp, Tr. 3066 (Kelley "asked me if I cared to comment and I declined to comment"); CX 673 (Crisp e-mail stating, "Gordon Kell[e]y of IBM asked me if we would comment which I declined."); CX 2089 at 136 (Meyer *Infineon* Trial Tr.) (*in camera*) (Kelley formulated the question as, "Do you want to give a comment on this"). *But cf.* G. Kelley, Tr. 2543 (unable to recall

tative, Crisp, shook his head "no."[267] Crisp did not explain whether that gesture meant that Rambus lacked such a patent, whether he did not know the answer to the question posed, or something else. He did *not* say that the gesture meant that Rambus would not disclose relevant patents or patent applications, and the record shows that those present did not read that into his gesture.[268]

The second incident relates to a May 1995 JEDEC subcommittee discussion of the SyncLink memory technology. This is not a technology at issue here.[269]

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whether he had said anything to Rambus and suggesting that it was Meyer who asked Rambus whether it had patentable material).

[267] *See* CX 673; CX 2089 at 135-37 (Meyer *Infineon* Trial Tr.) (*in camera*) ("he just shook his head"); Calvin, Tr. 1068-70 (Crisp responded in the negative); RX 290 at 3 ("NO RAMBUS COMMENTS"); RX 297 at 5 ("No comments given").

[268] Intel's Calvin testified that the incident gave him no concern. Calvin, Tr. 1070-71. Meyer and Kelley ultimately concluded that Rambus had no relevant patents. CX 2089 at 151-52 (Meyer *Infineon* Trial Tr.) (*in camera*); G. Kelley, Tr. 2545-46, 2562. Only IBM's Kellogg termed the lack of response by Rambus a concern, Kellogg, Tr. 5323, but he also testified that the May 1992 meeting did not cause him to understand that Rambus had intellectual property applicable to SDRAM. *Id.* at 5056.

[269] Crisp agreed that "the SyncLink proposal was similar to the Rambus architecture in a number of places." Crisp, Tr. 3254-55. SyncLink, like RDRAM but unlike SDRAM and DDR SDRAM, involved a narrow-bus technology, using multiplexing and packetization for command and address information. *See, e.g.*, Becker, Tr. 1203-04; Sussman, Tr. 1405 (SyncLink a "totally different architecture" from SDRAM and DDR SDRAM); G. Kelley, Tr. 2573; Crisp, Tr. 3254 (SyncLink packetized); CX 1069 (same); Kellogg, Tr. 5090-91 and 5095 (SyncLink involved a narrow bus and packetization; it had some similarities to RDRAM); Tabrizi, Tr. 9119. RamLink, from which SyncLink

A number of companies were asked whether they had relevant patents. Intel's Sam Calvin asked whether Rambus had patents relevant to SyncLink, and then DRAM task group chairman, IBM's Gordon Kelley, addressed to Crisp a request that Rambus provide a statement as to whether Rambus had patents that covered SyncLink.[270]

At the next JEDEC subcommittee meeting on September 11, 1995, Rambus furnished a written response that focused on its patents and patent applications relevant to SyncLink alone.[271] Indeed, except for the concluding sentence, the entire statement referred exclusively to SyncLink. The record shows that the JEDEC meeting attendees interpreted the statement as relating to SyncLink only and therefore of no moment.[272] Moreover, Rambus took additional

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evolved, used a narrow-bus, packetized, and fully multiplexed architecture, as did RDRAM. *See id.* at 9116-17, 9119; *see generally* RX 555 at 5 (April 1995 Crisp letter noting that RamLink and RDRAM "work in a very similar manner").

[270] *See* CX 711 at 73 (Crisp's meeting report, indicating that "Kelley asked to have us state whether or not Rambus knows of any patents especially ones we have that may read on Synchlink"); Crisp, Tr. 3266-67 (agreeing that Kelley asked for a report as to whether "Rambus knows of any patents that may read on SyncLink"); G. Kelley, Tr. 2578. JEDEC minutes of the meeting provide no specifics. *See* JX 26 at 10 (stating only, "Patent issues were a concern in this proposal.").

[271] *See* JX 27 at 26.

[272] *See* Sussman, Tr. 1411-13; Kellogg, Tr. 5093-96. Indeed, JEDEC's minutes described the discussion entirely in terms of SyncLink and its predecessor, RamLink. *See* JX 27 at 4 ("SyncLink/ RamLink patents were discussed. Rambus noted at the general meeting their position (see [the message presented by Crisp]).").

steps to deflect attention from the potential breadth of the statement's final sentence.[273] After Kelley commented that Rambus had not said anything, Crisp re-framed the final sentence in terms of SyncLink: "I reminded them . . . that our silence was not

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Between April and August 1995, Crisp told several people that SyncLink and RamLink likely violated Rambus's patents. *See* RX 555 at 5 (statement to Hyundai regarding RamLink); CX 711 at 73 (statement to Intel representatives regarding SyncLink), 80 and 90-91 (statement to JEDEC consultant regarding RamLink, forwarded by recipient to IBM and Hewlett Packard (HP) JEDEC participants, among others), 104-05 (statement to HP JEDEC participant regarding RamLink and SyncLink); RX 592 at 2 (August 1995 statement to SyncLink Consortium regarding RamLink and SyncLink). Although the ALJ treated Crisp's SyncLink/RamLink disclosures as giving notice regarding JEDEC standards, ID at 280-81, the record shows only that the disclosures raised concerns regarding SyncLink. For example, on June 12, 1995 – two days after receiving a copy of Crisp's statement regarding Rambus patents covering RamLink, CX 711 at 90 – IBM's Gordon Kelley called for an IBM review of possible Rambus patents on SyncLink. RX 575 at 6-7.

In this context, Rambus's September 1995 message sounded no alarm. As Crisp phrased it, subcommittee chairman Kelley's reaction was that "he heard a lot of words, but did not hear anything said." CX 711 at 166. Similarly, Motorola's meeting report termed the Rambus letter a "non-statement statement." RX 615 at 1. Crisp even encouraged the reaction that Rambus was revealing nothing new. *See* RX 576 at 2 (June 1995 Crisp e-mail to an HP JEDEC participant, noting that Crisp already had shared his personal opinion that Rambus patents would cover SyncLink and RamLink, and that in September Rambus would provide an "official" response to JEDEC's request "to report on our patent coverage relative to SyncLink").

[273] Rambus's statement ends, "Our presence or silence at committee meetings does not constitute an endorsement of any proposal under the committee's consideration nor does it make any statement regarding potential infringement of Rambus intellectual property." JX 27 at 26.

an agreement that we have no IP *related to SycLink* (sic). . . ."[274] In addition, Crisp reminded the members that Rambus previously had reported a patent to JEDEC, suggesting that this placed Rambus in the category of JEDEC members who had disclosed patents.[275]

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The record demonstrates that Rambus's course of conduct included two species of potentially deceptive conduct set forth in the Policy Statement:

–Rambus made potentially deceptive omissions via its continuing concealment of its patents and patent applications until after the DDR SDRAM standard was in place; and

–Rambus made outright misrepresentations when it gave evasive and misleading responses to questions about its conduct.

In addition, Rambus used information gained through its participation in JEDEC to help shape a patent-filing strategy that included filing patent applications covering key parts of the SDRAM and DDR SDRAM standards.

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[274] CX 711 at 167 (emphasis added).

[275] CX 711 at 167; Crisp, Tr. 3312-13. During its membership, Rambus disclosed no patent applications and only one issued patent to JEDEC, U.S. Patent No 5,243,703 ("the '703 patent"), which Rambus disclosed in September 1993. Crisp, Tr. 3173, 3176; CX 1801 at 3; Parties' First Set of Stipulations, Item 11. None of the claims of the '703 patent covered SDRAM or DDR SDRAM. *See* Parties' First Set of Stipulations, Item 10 (stating that as of January 1996 Rambus held no issued U.S. patents essential for compliance with any JEDEC standard); Crisp, Tr. 3173-74; Jacob, Tr. 5498-99.

This course of conduct was intentionally pursued, in accordance with a strategy that was spelled out in Rambus's own internal documents and e-mails. We conclude that Rambus's course of conduct had the potential to be deceptive and, under the circumstances of this case, exclusionary.

3. The JEDEC Environment

Next, we consider the standard-setting environment at JEDEC. The ALJ focused on whether JEDEC's rules imposed on JEDEC members an affirmative duty to disclose their patents and patent applications. Finding that the rules did not expressly contain such a requirement, the ALJ concluded that Rambus had no duty to disclose its patent filings and, therefore, that Rambus had not engaged in any wrongful conduct.[276] We respectfully find that this analysis and conclusion were erroneous. The Complaint in this case alleged not just a breach of a duty to disclose under JEDEC rules, but a course of conduct that was materially deceptive under *all* of the circumstances in which the standard setting occurred.[277]

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[276] *See* IDF 766-85, 902, 939-82; ID at 260-79.

[277] We recognize that the Federal Circuit in *Infineon* found Rambus not liable, ruling that Rambus had not breached a duty to disclose. However, the case before the Federal Circuit in *Infineon* was very different from the case here. In particular, the claim before the Federal Circuit was a state law fraud claim. Rambus, Inc. v. Infineon Tech. AG, 318 F.3d 1081, 1084, 1087 (Fed. Cir. 2003). In contrast, this case involves a federal antitrust claim alleging exclusionary, deceptive conduct. *See* FTC v. Freecom Commc'ns., Inc., 401 F.3d 1192, 1203 n.7 (10th Cir. 2005) ("A § 5 claim simply is not a claim of fraud as that term is commonly understood . . . ."). The standards of proof for these claims are different. To prove a fraud case in Virginia, the

In order to determine whether Rambus's course of conduct actually was deceptive, we need to consider the totality of the circumstances in which that conduct occurred. For the reasons discussed below, we find that JEDEC's policies (including the policies of its parent, EIA) and practices, considered as a whole, gave JEDEC's members reason to believe the standard-setting process would be cooperative and free from deceptive conduct. In that environment, we find that Rambus's course of conduct was likely to be "material" because it was likely to infect the decisions of JEDEC members with respect to the SDRAM standards to be adopted.

a. EIA/JEDEC Policies and their Dissemination

The record shows that although EIA/JEDEC policies are not a model of clarity, a duty of good faith underlies the standard-setting process under those

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plaintiff had to meet a clear and convincing evidence standard. *Id* at 1096. Here, Complaint Counsel must satisfy a lower preponderance of the evidence burden. *See supra* Section III.

Not only are the claims and evidentiary standards different, but so are the records. We take note that the joint appendix that presented the evidentiary record on which the Federal Circuit relied contained the testimony of only *two* industry witnesses (other than witnesses from Rambus and Infineon and the parties' experts) – AMI-2's Desi Rhoden (previously employed by HP and then by VLSI) and IBM's Gordon Kelley. In contrast, the record in this proceeding, from which we have assessed the industry's understandings and expectations, contains testimony from approximately 30 non-Rambus, industry witnesses. Our record includes testimony from five DRAM manufacturers and from major DRAM customers and developers of systems and complementary components, such as Sun, Compaq, Cray, Cisco, Intel, AMD, ATI, nVIDEA, Texas Instruments, and Sanyo, in addition to multiple witnesses from HP and IBM.

policies. Specifically, under the EIA/JEDEC rules, "[a]ll EIA standardization programs . . . shall be carried on in good faith under policies and procedures which will assure fairness and unrestricted participation . . . ."[278] Another general EIA regulation provides that EIA standardization programs "shall not be proposed or indirectly result in . . . restricting competition, giving a competitive advantage to any manufacturer, excluding competitors from the market . . . except where required to meet one or more of the" enumerated "legitimate public interest" objectives.[279]

To accomplish that EIA goal, as the majority opinion in *Rambus v. Infineon Technologies A.G.* declared,[280] JEDEC's Manual of Organization and Procedure (the JEDEC manual) expressly obligated the subcommittee chairperson to remind members to inform the meeting of any patents or applications "that might be involved in the work" being undertaken.[281]

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[278] CX 204 at 5.

[279] *Id.*

[280] 318 F. 3d 1081, 1098 (Fed. Cir. 2003).

[281] CX 208 at 19 (JEP21-I, JEDEC Manual of Organization and Procedure) (Oct. 1993). Although Rambus and the ALJ question whether this manual was officially adopted, *see* RB at 15-16, IDF 627-28, the record does not support that speculation. *See* CX 205 at 15 (establishing procedure for amending predecessor manual 21-H); CX 54 at 7, G. Kelley, Tr. 2428, and J. Kelly, Tr. 1925 (together establishing that the specified steps occurred). For present purposes, however, the important point is that manual JEP21-I was operative – it shaped JEDEC members' expectations. Numerous JEDEC members understood that the JEP21-I manual set out JEDEC's disclosure policies. *See, e.g.*, Rhoden, Tr. 311-13; Sussman, Tr. 1349; Landgraf, Tr. 1702-04; G. Kelley, Tr. 2408-09. Indeed, when Crisp requested a copy of JEDEC's patent policies in 1995, JEDEC sent him JEP21-I.

EIA General Counsel/JEDEC legal counsel John Kelly testified that JEDEC's rules required disclosure of patents and patent applications.[282] For most of the time that Rambus was a member of JEDEC, the JC 42.3 sub-committee chairman was James Townsend. Townsend created and delivered presentations designed to advise members of JEDEC's patent policy at each JC 42.3 subcommittee meeting, as

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CX 2104 at 215–16 (deposition transcript at 851-52) (Crisp *Micron* Dep.) (*in camera*).

[282] *See* J. Kelly, Tr. 1903-04 (disclosure "not optional"), 1925-27 (a "requirement to disclose"), 1870 (EIA Publication EP-3 means that participants need to disclose known patents and patent applications), 1894 (Kelly always understood "patent" to include applications), 1897 (coverage of applications was necessary to make the protections effective), 1931-33 (JEP21-I was an effort "to make it abundantly clear" and "to be emphatic, to pound the table" after WANG had argued that JEDEC patent policy did not reach applications), 1935-36 ("patentable" in sign-in sheets refers to applications). John Kelly served as General Counsel of EIA and legal counsel for JEDEC from September 1990 through the time of the Commission's trial. *Id.* at 1750, 1754. He also became President of JEDEC in early 2000. *Id.* at 1751. Kelly was responsible for providing "legal guidance relating to standardization activities," including dealing with questions regarding "the patent policy of EIA and JEDEC." *Id.* at 1813-14. He testified that he had the "last word" within EIA on how rules were to be interpreted and applied and the "final word" in interpreting and applying JEDEC's separate rules. J. Kelly, Tr. 1822, 1915. Others supported Kelly's descriptions. *See* Rhoden, Tr. 313-14, 345; Sussman, Tr. 1348-49 (people with questions regarding patent policy were referred to Kelly); Grossmeier, Tr. 10957 (same); CX 208 at 18 (JEDEC manual stating, "EIA Legal Counsel can advise the Council and committees from time to time concerning interpretation of legal guides."); CX 306 (EIA/JEDEC Meeting Attendance Roster, referencing EIA patent policy and stating, "Consult the EIA General Counsel about any doubtful question.").

well as at other JC 42 subcommittee meetings.[283] He also delivered this presentation to new members during their orientation.[284]

Furthermore, JEDEC's policies expressly required those disclosing relevant patents or patent applications to supply full technical information and to provide RAND assurances (*i.e.*, that royalties on patents covering any standard would be reasonable and nondiscriminatory) before their patents were incorporated into JEDEC standards. As presented in Appendix E to the JEDEC manual, "Standards that call for use of a patented item or process may not be considered by a JEDEC committee unless all of the relevant technical information covered by the patent or pending patent is known to the committee, subcommittee, or working group," and the patent holder submits written assurance that it will license without charge or under "reasonable terms and conditions that are demonstrably free of any unfair discrimination."[285]

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[283] *See, e.g.*, Rhoden, Tr. 324-25, 330; Williams, Tr. 771, 785; Calvin, Tr. 1007-08; Landgraf, Tr. 1694-95; CX 42 at 3. The JC 42 committee and its subcommittees met four to eight times per year, and these meetings lasted several days. Rhoden, Tr. 340. The subcommittee meetings were staggered, permitting Townsend to make his patent presentation at multiple subcommittee meetings. If a JEDEC member participated in more than one subcommittee, the member would hear Townsend's patent presentation multiple times. *Id.* at 338-42.

[284] Rhoden, Tr. 337-42.

[285] CX 208 at 27; *see also* J. Kelly, Tr. 1885-86; CX 208 at 19 (noting that "the word 'patented' also includes items and processes for which a patent has been applied and may be pending"); CX 203a at 11 (EIA Engineering Publication EP-3-F) (1981); CX 207a at 8 (EIA Engineering Publication EP-7-A) (1990); JX 55 at 28 (EIA Engineering Publication EP-7-B) (1995).

b. Rambus's Understanding of JEDEC's Policies

Following the lead of the Federal Circuit's *Infineon* opinion, we look to the behavior, understandings, and expectations of JEDEC members, including Rambus, to inform our understanding of the JEDEC environment.[286] Rambus's own documents and witnesses indicate that the company believed it should have disclosed its patent filings. For example, Rambus's JEDEC representative, Crisp, understood that "[t]he job of JEDEC is to create standards which steer clear of patents which must be used to be in compliance with the standard whenever possible."[287] Rambus was aware of JEDEC's disclosure policy through written manuals and oral presentations.[288] Crisp understood that disclosure of patents was mandatory,[289] and as early as December 1992, he acknowledged

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[286] *See* Rambus, Inc. v. Infineon Techs. *AG*, 318 F.3d 1081, 1098 (Fed. Cir. 2003).

[287] CX 903 at 2; Crisp, Tr. 2941-42.

[288] Crisp attended a JEDEC meeting at which revisions subsequently incorporated into the JEDEC manual – including specific references to pending patents and to the participants' obligation to disclose – were presented. *See* JX 14 at 1, 3, 25 (minutes of JC 42.3 meeting, December 9-10, 1992, providing text with proposed changes underlined); Rhoden, Tr. 312; G. Kelley, Tr. 2418.

[289] Crisp, Tr. 3477-78 (stating that "[n]on-presenters were obligated to disclose any known patents they had at the time of the committee letter ballot if those patents were required to – were required by the standard" and that presenters were required to disclose patents and applications earlier); *see also* CX 868 (February 1996 Crisp e-mail stating, with reference to a presentation to JEDEC by Micron, "I think we should have a long hard look at our IP and if there is a problem, I believe we should tell JEDEC there is a problem.").

that he understood that patent applications had to be disclosed under JEDEC's policies at least "in some circumstances."[290]

c. Other JEDEC Participants' Understanding of JEDEC's Policy Objectives

Other witnesses besides Crisp testified that JEDEC had determined that prompt disclosure of relevant intellectual property was important for its standard-setting process to work.[291] Absent such disclosure, JEDEC members would face the possibility of patent hold-up. A member possessing relevant intellectual property could stay silent while JEDEC adopted a standard. Then, after a standard had been adopted and it had become expensive to switch to what initially were good alternatives, the patentee could assert its patent and "hold up" the industry by charging higher royalties than could have been extracted before the standard was set. Witnesses testified that early disclosure of intellectual property

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[290] Crisp, Tr. 2978, 2982, 3477-78. *See also* CX 5105 (December 1992 Crisp e-mail stating "I know that JEDEC takes the position that we should disclose," but commenting, "Of course, we believe that we do not want to do this [disclose patent applications] yet.").

[291] *See, e.g.*, Rhoden, Tr. 536 (describing a "fundamental premise inside JEDEC" that standards that are developed are "either free of intellectual property or at least all intellectual property is known at the time of creation of the standard"); Calvin, Tr. 1002 ("you at least needed to understand the [e]ffect of patents upon things that you were standardizing"); Landgraf, Tr. 1694 ("the purpose of the policy is to disclose and make sure that standards do not have any conflicts down the road with their potential use").

helped to identify potential hold-up situations while there still was time to avoid the problem.[292]

For example, EIA General Counsel/JEDEC legal counsel John Kelly testified that JEDEC sought to prevent members with patents covering JEDEC standards from exercising "unbridled discretion to license that IP on any terms and conditions that they elect."[293] He explained:

> Having the technology included in the standard is a privilege, and the condition for that – for having that privilege is to agree to a restriction on licensing. That in turn allows the marketplace to know that they're dealing with a standard that anyone can comply with on a – on a reasonable basis without – without being, if you'll excuse the expression, gouged in terms of IP licensing royalties.[293]

Other witnesses agreed that JEDEC wished to secure knowledge of potential patents and protections against the unrestricted exercise of patent rights.[295]

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[292] *See* Landgraf, Tr. 1694 ("The worst thing to have is a standard and products made according to that standard and then later you find an infringement . . ."); J. Kelly, Tr. 1908 ("It's essential to know what impediments there are to the process, what issues there are going forward, and to know when it's necessary to obtain the written assurances."). Even if the standard later could, in theory, be revised to avoid patent issues, that would entail added cost and potentially crippling delay. *See* Rhoden, Tr. 299-300 ("delay is not a viable market option. . . . You have to move in real time at the time that technology is being developed to create the standards.").

[293] J. Kelly, Tr. 1777.

[293] *Id.* at 1782.

[295] *See, e.g.*, Williams, Tr. 771-72, 794; Calvin, Tr. 1002; Sussman, Tr. 1333. Rambus suggests that a portion of the EIA

d. Disclosure Expectations of JEDEC Members

A number of witnesses besides Crisp testified that they understood that the disclosure of *patents* and *patent applications* was expected. For example, witnesses from Micron,[296] NEC/Sanyo,[297] AMI-2,[298] Intel,[299]

Legal Guides rejects any goal of avoiding hold-up. RB at 9-10; *see also* ID at 261-62. According to those Guides, "Standards are proposed or adopted by EIA without regard to whether their proposal or adoption may in any way involve patents . . . ." CX 204 at 4. The Initial Decision correctly construes this as a "non-liability disclaimer," IDF 633 – the next sentence of the EIA Legal Guides states that EIA does not assume any obligation to parties adopting EIA standards. CX 204 at 4; *see also* J. Kelly, Tr. 1836-37. Treating this as evidence that JEDEC had no goal of avoiding hold-up stretches a mere disclaimer beyond its limits. The language reveals a willingness to accept patented technologies for standardization under stated conditions, but that does not negate a parallel objective to protect against hold-up whenever patented technologies are adopted. *See* J. Kelly, Tr. 1837-40.

[296] *See* Williams, Tr. 771-72, 774 (members "had to" disclose), 788-89, 791-96 (disclosure of applications required during 1991-93 period); Lee, Tr. 6595-96 (from the time that he started attending JEDEC meetings in the mid-1990s, disclosure of applications was required); Lee, Tr. 6695-96 ("a requirement to disclose").

[297] *See* Sussman, Tr. 1333, 1346 (disclosure "required," not voluntary), 1333-34 (disclosure of applications required), 1341-42 (requirement to disclose applications antedated JEP21-I by at least 10 years).

[298] *See* Rhoden, Tr. 309, 317-19, 344-45 ("everyone had the obligation to disclose"), 619 ("you were obligated to disclose"), 627, 317 (disclosure of applications was always required), 320-21, 332 (Townsend would always say disclosure of applications was required), 357 (duty to disclose covered applications), 637 (same).

[299] *See* Calvin, Tr. 1003-04 ("anyone who was aware of patent – patented items, that could affect policy, had an obligation

and Hewlett Packard (HP),[300] among other JEDEC participants,[301] consistently testified that JEDEC members were "obligated" or "required" to disclose both patents and applications.[302]

Several of these witnesses also testified to an expectation that members would disclose planned amendments to pending applications. One witness testified that there was an obligation to disclose "everything that is in the patent process . . . if you intend to seek protection of your intellectual property as it relates to the standard . . . ."[303] Similarly, another witness testified that the disclosure obligation fo-

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to bring that awareness to the group); 1006-07 (a requirement to disclose patent applications), 1012-13 (same).

[300] Landgraf, Tr. 1693-95 (from the time that he started attending JEDEC meetings in 1994, disclosure of applications was required).

[301] *See, e.g.*, CX 3135 at 102 (Chen FTC Dep.) (*in camera*); McGrath, Tr. 9245 (during the 1992-96 period there was "an expectation that patent applications would be disclosed"); CX 2089 at 142-43 (Meyer *Infineon* Trial Tr.) (*in camera*) (JEDEC disclosure rules covered applications in April-July 1992).

[302] IBM's Gordon Kelley believed that the understanding that disclosure of applications was mandatory may have developed over time, with two JEDEC Committees, JC 42 and JC 16, requiring disclosure of applications by 1991 and JEDEC as a whole doing so by 1993. *See* G. Kelley, Tr. 2667-70, 2685-86, 2690-92. A witness from Mitsubishi presented varying descriptions. *See* CX 3135 at 16 (Chen FTC Dep.) (*in camera*) (disclosure of applications was one step beyond requirements; Mitsubishi had disclosed applications "multiple times"), 102 (disclosure of applications was required), 111. One other witness stated that it was his understanding that applications did not have to be disclosed if any ensuing patents would be made available under reasonable and nondiscriminatory terms, but that that "may have been wrong." Wiggers, Tr. 10591.

[303] Rhoden, Tr. 317-21, 636.

cused on the reasonable possibility that a firm's "invention" might apply to what was being discussed within JEDEC, "no matter what stage a patent might be."[304] As stated succinctly by a former HP employee, "the expectation was that members would disclose anything they're working on that they potentially wanted to protect with patents down the road."[305]

e. The Behavior of JEDEC Participants

The expectation that members would disclose their patents and patent applications was supported by their actions. Although JEDEC's members were not expected to disclose if they did not plan to enforce their patents against JEDEC-compliant standards,[306]

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[304] Williams, Tr. 788, 791.

[305] Landgraf, Tr. 1698-99. *See also* Sussman, Tr. 1341 ("something that you're about to apply for"); G. Kelley, Tr. 2406-07 (there was an obligation to disclose "material that would probably become a patent"). EIA General Counsel/JEDEC legal counsel John Kelly explained that the need to disclose when making plans to amend derived from the *present* "interpretation of the original patent or patent application," not from "the future plan, as such." J. Kelly, Tr. 1995. *But see* CX 3136 at 28-29 (Meyer *Infineon* Trial Tr. 110-11) (*in camera*) (stating his understanding that disclosure of plans to modify applications was not required, but explaining that he drew this conclusion only from an absence of discussion of the issue and that he could not state whether or not this was JEDEC's policy).

[306] For example, Micron's Terry Lee testified that Micron had failed to disclose patent activity in or around 2000 when it had "no intent on enforcing the patent against the standard." Lee explained, "My understanding was that if they failed to disclose the patent that may relate to the work of the committee and if it was adopted into the standard, that they would forego their right to enforce the patent against the standard." Lee, Tr. 6599. Micron also disclosed three burst EDO patent applications in April 1996, after the standard already had been issued. *See* Williams, Tr. 937-40. A Micron representative testified that

there were numerous examples of JEDEC members disclosing patents and applications relevant to the standards under consideration. For example, in February 1992, during Rambus's first JEDEC meeting as a member, Fujitsu disclosed a patent application, as described by initial Rambus JEDEC representative Garrett in a memorandum to Rambus staff.[307]

JEDEC and its members reacted negatively when members sought enforcement after failing to disclose that a patent was issued or pending, and without providing the necessary RAND assurances. The record reveals three such instances – all of which were known to Crisp and thus to Rambus.[308]

Micron never intended to enforce patents on burst EDO against firms that might practice JEDEC's burst EDO standard. *Id.* at 960-62. *But cf.* CX 364 (Micron letter disclosing the patents to JEDEC and affirming that "[i]n accordance with EIA/JEDEC patent policy" if a patent issued, Micron would license under RAND terms). Burst EDO died, and the standard never became a factor in the market. Williams, Tr. 961-62. Another example was Hitachi's failure to disclose a patent that was never enforced. Sussman, NEC/Sanyo's JEDEC representative, testified that, " . . . Hitachi has never tried to apply the patent, so some engineer has a few extra dollars, and basically a [sic] don't care." Sussman, Tr. 1337-38.

[307] CX 672 at 1; *see also* JX 22 at 14-16 (patent tracking list showing disclosure of both issued patents and applications); CX 42 at 16-17 (same); JX 28 at 6 (minutes describing MOSAID's December 1995 disclosure of "a patent pending on DLL"); CX 711 at 169 (Crisp's description of Fujitsu's disclosure of an application in September 1992); RX 1559 at 2 (Micron's January 2000 disclosure of an application); CX 3135 (Chen FTC Dep.) (*in camera*) at 16-17 (Mitsubishi disclosed patent applications "multiple times"), 111.

[308] *See* CX 711 at 188 (Crisp e-mail discussing incidents involving Wang and SEEQ); CX 346 (JEDEC minutes reporting on JEDEC members' reaction to Texas Instruments's conduct).

The first instance occurred in the late 1980s and early 1990s involving then-JEDEC member Wang Laboratories. Wang held a patent application relating to memory modules.[309] During its membership, Wang helped JEDEC set a standard relating to memory modules, but failed to disclose its intellectual property.[310] After the standard was adopted, Wang sought to enforce its patents against the industry.[311] Considerable litigation ensued, and the incident generated concern and discussion among JEDEC participants about the need to prevent the problem from recurring.[312]

The second instance involved a proposal by a company called SEEQ, which sought adoption of a standard regarding silicon signature.[313] SEEQ had two patents or applications relating to the technology, but disclosed, and provided licensing assurances for, only one.[314] JEDEC learned of the second item when it was recommending standardization of the SEEQ technology, and it sought RAND assurances, which SEEQ apparently refused.[315] Ultimately, JEDEC chose an alternative technology.[316] Although the events traced

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[309] IDF 689. *See* J. Kelly, Tr. 1931-32.

[310] IDF 690.

[311] Williams, Tr. 787; Sussman, Tr. 1338; Landgraf, Tr. 1697-98.

[312] J. Kelly, Tr. 1932; Grossmeier, Tr. 10954.

[313] Sussman, Tr. 1338.

[314] *Id.* at 1338-39.

[315] CX 3 at 4; CX 711 at 188.

[316] *See* Sussman, Tr. 1338-39.

to 1989, they left "a negative taste in our mouth" that was still "almost current" in 2003.[317]

The third occurrence involved an attempt by Texas Instruments (TI) to enforce an undisclosed patent on Quad CAS technology. After JEDEC learned of the patent in 1993, the JC 42.3 subcommittee placed a ballot covering the technology on hold,[318] and voted to withdraw a preexisting standard.[319] It took the ballot off hold and dropped the withdrawal of the standard only after TI had provided satisfactory assurances of compliance with JEDEC's licensing policies.[320] A witness from Micron testified that TI's actions led to "a great uproar" and that TI's representative was "pummeled in th[e] meeting for his failure to disclose."[321] Crisp reported to his superiors that TI was "chastised" for not reporting the patent and that discussion was "nasty."[322] In the course of the dispute, IBM's Gordon Kelley, chairman of JC 42.3's DRAM Task Group, addressed TI in the strongest of terms:

> I am and have been concerned that this issue can destroy the work of JEDEC. If we have companies leading us into their patent collection plates, then we will no longer have companies willing to join the work of creating standards . . . . If we allow JC-42 standards to be used for patent collection pur-

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[317] *See* Sussman, Tr. 1339 ("[W]e were making nasty comments about SEEQ for years . . . .").

[318] JX 17 at 6-7.

[319] JX 18 at 7-9.

[320] JX 25 at 5.

[321] Williams, Tr. 776-77.

[322] Crisp, Tr. 2969, CX 710 at 1. *See also* CX 346.

> poses, then we do a great disservice to the very industry that feeds us.[323]

JEDEC's responses to the SEEQ, Wang, and TI incidents evidence that JEDEC members believed that these firms had acted in ways contrary to JEDEC's policies and members' expectations.

f. Knowledge of JEDEC Participants

The ALJ concluded[324] that since 1989 the DRAM industry has been aware of Rambus's inventions in the relevant markets and its plans to seek patent protection. Rambus points to presentations regarding its technologies made to several JEDEC members before and during its membership.[325] Rambus also cites, and the ALJ highlighted, Rambus's publication in the early 1990s of technical descriptions of its inventions, as well as Rambus's 1992 distribution of marketing brochures describing its technology in conjunction with the public announcement of its busi-

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[323] CX 2384 (G. Kelley letter to TI of January 14, 1994).

[324] ID at 305-09.

[325] *See, e.g.*, RX 273 (Rambus presentation to IBM in April 1992). These presentations were covered by nondisclosure agreements, required by Rambus from each company that was exposed to RDRAM technology. *See* Parties' First Set of Stipulations, Items 3-7 (noting nondisclosure agreements with NEC, Sony, Toshiba, HP, and Samsung); Kellogg, Tr. 5053 (stating that Rambus met with International Business Machines (IBM) and required "a nondisclosure agreement of sorts"); Bechtelsheim, Tr. 5816-19 (noting that Rambus met with Sun Microsystems (Sun) and required nondisclosure agreements); CX 535 at 1 (stating Rambus's intention to secure nondisclosure agreements from "all parties exposed to the [Rambus] technology"). These nondisclosure agreements barred those hearing the presentations from sharing Rambus information with other firms.

ness plan.[326] Rambus further argues that statements during its campaign to convince various industry players to adopt and license RDRAM placed the industry on notice regarding Rambus's intellectual property.[327]

The only information that Rambus made available, however, was that it was claiming patent rights with regard to technologies in *RDRAM* – not with respect to SDRAM, DDR SDRAM, or any JEDEC-based successors. The prevailing view in the industry was that RDRAM, with its narrow-bus architecture and its multiplexing and packetization, was quite different from the SDRAM and DDR SDRAM standards that were being developed by JEDEC.[328] JEDEC repre-

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[326] RB at 37; IDF 109-21, 130-34, 144-58; ID at 306.

[327] *See* RB at 36-37.

[328] *See, e.g.*, Rhoden, Tr. 402-03; (RDRAM was multiplexed and packetized); Sussman, Tr. 1431-33 (same); Lee, Tr. 6602-03 (RDRAM used narrow bus and was multiplexed); Farmwald, Tr. 8275 (RDRAM packetized); Horowitz, Tr. 8617-18 and 8620 (RDRAM multiplexed), 8621 (RDRAM packetized); CX 1451 at 9, 43 ('898 application describing a "narrow, multiplexed (time-shared) bus"); RX 81 at 7 (1992 Rambus Corporate Backgrounder describing Rambus technology as "a narrow, high-speed bus"). (Although the initial idea behind RDRAM was to use a narrow bus, Horowitz, Tr. 8619-20, as time went by RDRAM's bus widened. *See* Farmwald, Tr. 8143-44.)

In contrast, SDRAM and DDR SDRAM had a wider bus, little or no multiplexing, and were not packetized in the same sense as RDRAMs. *See, e.g.*, Rhoden, Tr. 400-01 (SDRAM had a wider bus than RDRAM); Sussman, Tr. 1439 (same); G. Kelley, Tr. 2573-74 (JEDEC DRAMS were not packetized); Kellogg, Tr. 5298 (JEDEC did not consider narrow bus, packetized architecture); Jacob, Tr. 5462-64 and 5470-71 (JEDEC-based DRAMs used wider buses), 5464-67 (SDRAMs used separate buses for data, control, and address information and were not packetized in same way as RDRAMs); Bechtelsheim, Tr. 5841 (RDRAM

sentatives who viewed an RDRAM presentation emerged with the view that RDRAM bore little or no resemblance to JEDEC-compliant SDRAM.[329] For example, IBM's Gordon Kelley testified that after Rambus presented its technology to IBM in April 1992, he believed that "the Rambus DRAM [RDRAM] was so different from the synchronous DRAM being discussed at JEDEC that [he] just did not believe that anything that Rambus had on the RDRAM might apply to the SDRAM or to JEDEC."[330] Indeed, Rambus's own Joel Karp highlighted the extent to which the industry perceived fundamental differences between RDRAM and SDRAM/DDR SDRAM when, in May 1999, he stated, "They probably think they avoid our IP if they don't go 'packet based.'"[331] Under these circumstances, an awareness that Rambus held or likely would seek patents covering RDRAM did not equate to any contemplation that Rambus could or would obtain patents on SDRAM or DDR SDRAM.

The ALJ and Rambus also rely on the publication in October 1991 of Rambus's international patent application, known as the PCT application, to show that the industry had notice that Rambus might acquire patents covering SDRAM and DDR SDRAM.[332] Ram-

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used a packet transaction format, and SDRAM did not); Tabrizi, Tr. 9119 (JEDEC DRAMS were not multiplexed).

[329] *See* G. Kelley, Tr. 2538; Sussman, Tr. 1439-40; Kellogg, Tr. 5053; Lee, Tr. 6602-03.

[330] G. Kelley, Tr. 2537-38.

[331] CX 1069.

[332] *See* RB at 39-41, 117; ID at 298, 307. This application, filed pursuant to the Patent Cooperation Treaty ("PCT"), CX 1454 at 1; IDF 826, was virtually identical to the '898 application, the parent application for the patents that Rambus has

bus similarly relies on its September 1993 disclosure to JEDEC of the '703 patent, which had substantially the same written description as the PCT and '898 applications.[333]

We find that these materials did not provide notice that Rambus might seek to enforce patent rights covering the standards under consideration by JEDEC. None of the original 150 claims in the '898 patent application – which were reproduced in the PCT application – covered SDRAM or DDR SDRAM;[334] nor did any claims in the '703 patent.[335] Although notice might come from the written descriptions as well as from the claims, those descriptions, like Rambus's RDRAM marketing efforts, suggested that claims would be confined to the RDRAM architecture – with a narrow bus, multiplexing, and packetization. Several JEDEC members reviewed Rambus's PCT application or '703 patent and concluded that they had no relevance to JEDEC's standards. Thus, when Infineon's Meyer read the PCT application and the '703 patent, he understood them to relate to RDRAM, including, specifically, its multiplexing.[336] And when Micron's Terry Lee reviewed Rambus's patent abstracts and the '703 patent in 1995, he concluded that the patents "seemed to apply kind of specifically to

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asserted against SDRAM and DDR SDRAM manufacturers. *See* IDF 826; Fliesler, Tr. 8811; CX 1451; CX 1454; Parties' First Set of Stipulations, Item 22.

[333] IDF 181; Jacob, Tr. 5500-01.

[334] Nusbaum, Tr. 1526; Jacob, Tr. 5494; Parties' First Set of Stipulations, Item 9 (discussing SDRAM).

[335] Parties' First Set of Stipulations, Item 10; *see also* Crisp, Tr. 3173-74; Jacob, Tr. 5498-99.

[336] *See* CX 2089 at 147-48 (Meyer *Infineon* Trial Tr.) (*in camera*).

this bus architecture, to this RDRAM product. . . . the narrow bus with the command/address/data multiplexed with this Rambus architecture and Rambus signaling scheme."[337] Even Rambus's own JEDEC representative, Crisp, initially read the '898 application as limited to multiplexed, packetized architectures, *i.e.*, to RDRAM.[338]

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[337] Lee, Tr. 6610-11; *see also* Sussman, Tr. 1445, 1449-54 (stating that he found no connection between the PCT application and JEDEC's work). *But cf.* Sussman, Tr. 1467-68 (concluding that a portion of the PCT application highlighted by Rambus counsel did relate to dual-edge clocking).

Rambus argues that because Mr. Lee in 1997 informed JEDEC that a Rambus patent might relate to JEDEC's work, he could not have believed that the Rambus architecture mattered. RB at 41. The technology that Mr. Lee identified to JEDEC was a loop-back clocking scheme, Lee, Tr. 6956-64, one of only two aspects of the '898 application that *did not* contain the multiplexed bus limitation that distinguished Rambus's architecture from JEDEC's work. Nusbaum, Tr. 1520, 1528. Rambus also points to an incomplete translation of Mitsubishi's analysis of the PCT application; the translation shows awareness that the application covered relevant technologies, and found "similar[ity] to SDRAM's latency control," but it also includes several references to "packets" or "packetize[d] bus" and does not indicate whether claims could extend beyond the RDRAM architecture. *See* RX 379a and RX 2213a. Mitsubishi subsequently recommended concentrating on "a wide-bus approach" because "Narrow-bus is Rambus look alike," suggesting that Mitsubishi still believed that avoiding RDRAM architecture mattered. RX 852 at 1.

[338] Crisp, Tr. 2926-27. Crisp added that over time his view of the scope of Rambus's application changed. *Id.* at 2927-28. Rambus's expert witnesses asserted that the written descriptions would have given notice of the potential reach of Rambus's claims, *see, e.g.*, Fliesler, Tr. 8788-89, 8810; Geilhufe, Tr. 9556-59, but Complaint Counsel's experts stated the opposite. *See* Nussbaum, Tr. 1642-43; Jacob, Tr. 5460-67; 54576-85, 5490, 5493, 5498-501.

Rambus attempts to transform its argument into a matter of law by presenting the following syllogism: (1) the PTO may only approve patents when their written description covers their claims; and (2) the PTO issued the patents that Rambus has sued upon; so that (3) the written description in the '898/PCT applications and the '703 patent necessarily must have given adequate notice to the world of every claim that eventually issued.[339] This miscasts an inquiry designed for application with hindsight as a test for the reasonable bounds of foresight. The ability, after the fact, to determine from a written description that at the time of filing an applicant "*was* in possession" of a particular invention "*now* claimed"[340] is not the same thing as the ability to predict, prior to their publication, the potential scope of future claims.[341] Rambus's own patent expert regarded the unrevealed claims of a published application as "the family jewels."[342] Rambus avoided displaying those jewels to JEDEC members, and we find that, without knowledge of Rambus's eventual

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[339] RB at 39-40.

[340] *See* Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991) (describing patent law's written description requirement) (emphasis added).

[341] Rambus acknowledges this distinction, averring that "[a] patent application continues to hold valuable trade secrets even after the written description becomes public . . . . Disclosure of the written description does not reveal the *claims* in the pending application." RB at 87 (emphasis original).

[342] Fliesler, Tr. 8896. Fliesler agreed that "[a]n engineer or a patent lawyer could not have known for certain what Rambus would claim from reading the 898 specification," *id.* at 8902, although he nonetheless insisted that the 898 application "indicat[ed]" that Rambus had invented the four relevant technologies as used in SDRAM and DDR SDRAM. *Id.* at 8904-05.

claims, JEDEC members were unable to foresee the implications of the pending applications.

Finally, the ALJ and Rambus point to two incidents – one involving IBM and Siemens in 1992, the other involving Rambus licensing negotiations in 1995 – to demonstrate the industry's awareness of Rambus's relevant patents and patent applications. The IBM/Siemens incident involved a conference call on April 29, 1992, recorded as follows in Siemens's notes: "RAMBUS has announced a claim against Samsung for USD 10 million due to the similarity of the SDRAM with the RAMBUS storage device architecture."[343] The only concern, however, was that Rambus might have a patent on a technology outside any of the alleged relevant product markets in this case.[344] Ultimately, IBM and Siemens both concluded that Rambus posed no patent problems for SDRAM.[345]

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[343] RX 286a at 2. The record does not provide details regarding this claim which, had it existed, would have antedated Rambus's first issued patent by more than a year. Parties' First Set of Stipulations, Item 11; CX 1460 at 1.

[344] *See* RX 297 at 5 (showing that a few days later, in the course of discussing two-bank designs at JEDEC's May 4-8, 1992 meetings, Siemens and Philips indicated that they were "concerned about [the] patent situation" with regard to Rambus and Motorola); *see also* RX 303 (June 1992 presentation by Gordon Kelley to IBM and Siemens engineers listing "cons" for SDRAMs to include "Patent Problems? (*Motorola/Rambus*)") (emphasis added); CX 2089 at 41-44 (Meyer *Infineon* Trial Tr.) (the concern in May 1992 for Meyer was the possibility that Rambus might obtain patents covering two-bank synchronous DRAM design); RX 289 at 1 (Siemens document prepared by Meyer on May 6, 1992, stating concern that "2-BANK SYNC MAY FALL UNDER RAMBUS PATENTS"). Although the ALJ also cites an IBM "Rambus Assessment" as revealing IBM's concern that Rambus might have patents over SDRAM, IDF 791-

The other incident involved Rambus meetings with LG Semiconductor, Samsung, NEC, and Oki in 1995, at which Rambus CEO Tate claimed he announced that Rambus was seeking patents on DDR SDRAM.[346] In his testimony, Tate did not indicate the specific information that he purportedly conveyed. While his testimony names on-chip PLL and dual-edge clocking as the likely technologies at issue, nowhere does he state that he identified those technologies to the outside firms.

Other evidence suggests that any information conveyed by Rambus would have been opaque. Indeed, a 1997 Tate e-mail indicates that LG continued to believe that DDR SDRAM was a "royalty-free alternative[]" to RDRAM.[347] Moreover, Rambus President Mooring admitted that, to the best of his knowledge, Rambus did not inform any DRAM manufacturer that [Rambus intellectual property covered SDRAM and did not tell anyone that on-chip PLL might infringe a Rambus patent until late 1999.[348] Similarly, Rambus's Senior Vice President Gary Harmon testi-

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95, ID at 307, the document says nothing about such patents. RX 279.

[346] G. Kelley, Tr. 2537-38, 2545-46; CX 2089 at 151-52 (Meyer *Infineon* Trial Tr.) (*in camera*).

[346] CX 2111 at 313-21 (Tate FTC Dep.) (*in camera*).

[347] CX 957 at 1. Tate did not correct LG's misimpression, despite having an incentive to do so if he already had chosen to inform LG of Rambus's patent position on DDR SDRAM.

[348] CX 2112 at 172-73, 179-80 (deposition transcript at 171-72, 178-79) (Mooring FTC Dep.) (*in camera*). Rambus apparently did tell Intel in late 1997 or early 1998 that Rambus might have patent applications related to DDR, but Rambus provided "no specifics" and gave "nothing concrete" as to what the applications covered. MacWilliams, Tr. 4905.

fied that any discussion relating to the [scope of Rambus's patents in the course of 1993-96 licensing negotiations, including those with all four firms identified by Tate, would have been "just a passing reference" and that, even in the case of the one firm with which discussions were more extensive, "I don't believe we ever specifically stated that we had intellectual property that applied to – outside of the Rambus-compatible area]."[349]

JEDEC members repeatedly testified that they were unaware of Rambus's patent position when they adopted the standards. NEC/Sanyo's Sussman testified that prior to 1999 Rambus never suggested or

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[349] CX 2070 at 42-47 (Harmon *Micron* Dep.) (*in camera*). In addition, a 1997 e-mail from the Chairman of Rambus's Board of Directors, William Davidow, stated that "[o]ne of the things we have avoided discussing with our partners is [the] intellectual property problem," which he identified as the fact that "SLDRAM and SDRAM-DDR infringe our patents." CX 938.

Even assuming *arguendo* that certain JEDEC representatives who observed Rambus's presentations were aware of the extent of Rambus's patent portfolio, each representative's company was prohibited by non-disclosure agreements from discussing the content of Rambus's license presentations. *See, e.g.*, RX 24 at 2-3 (nondisclosure agreement between Rambus and IBM); RX 570 (nondisclosure agreement between Rambus and NEC); Rhoden, Tr. 521 (HP); Kellogg, Tr. 5052-53 (IBM); Bechtelsheim, Tr. 5818-19 (Sun); CX 673 (Crisp, interpreting NEC's nondisclosure agreement to bar circulation of a published international patent application). JEDEC members would not have been able to discuss the implications of Rambus's patents, absent disclosure by Rambus itself. *See, e.g.*, CX 993 (Tate 1998 e-mail stating, "[O]ur partners employee's [sic] working on competitive products, e.g., DDR, might have access to our confidential information. [T]hey might even go to committees like jedec to discuss DDR. BUT they are obligated as employees of our partners' [sic] to keep our confidential information secret . . . .").

did anything that put him on notice that its patents might relate to either SDRAM or DDR SDRAM.[350] HP's Landgraf stated that while he was at JEDEC (from 1994 through 1998), he "did not know of patents or patent applications with regard to dual edge clock or PLL on chip" and believed that the DDR SDRAM standard was free of undisclosed patents.[351] Cisco's Bechtelsheim termed Rambus's infringement suits "a complete surprise"; when asked whether before 2000 he had ever heard any rumor or suggestion that Rambus might have patents that would extend to SDRAM or DDR SDRAM, Bechtelsheim answered, "I did not."[352] Similarly, IBM's Gordon Kelley testified that when he voted to include programmable CAS latency and burst length in SDRAM, he had no understanding that Rambus might have relevant patents.[353]

Contemporaneous views support this testimony. In October 1993, when Willibald Meyer prepared documentation for Siemens of the status of work regarding SDRAM, he concluded that "we had managed to define a public domain version" of the next generation DRAM, free of intellectual property.[354] Hyundai's July 1997 "DRAM Product Roadmap" described DDR SDRAM as the most "cost effective" next generation DRAM with an "open architecture without royalties or fees."[355] A 1998 Siemens presentation compares

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[350] Sussman, Tr. 1455-56.

[351] Landgraf, Tr. 1711-12.

[352] Bechtelsheim, Tr. 5880-81.

[353] G. Kelley, Tr. 2561-62.

[354] CX 2089 at 151-52 (Meyer *Infineon* Trial Tr.) (*in camera*).

[355] CX 2294 at 15. Similarly, Hyundai's 1998 cost comparison between DDR SDRAM and Direct RDRAM listed "Direct Ram-

RDRAM's "Proprietary solution (Royalties, License fees)" unfavorably with SDRAM II's "Open standard."[356]

In addition, it makes little sense that JEDEC members – which had, for example, "chastised" TI during a "nasty" discussion when it attempted to enforce an undisclosed patent[357] and which cared deeply about cost[358] – would, if they had known about Rambus's patents and patent applications, simply have ignored them and, knowingly and without discussion or hesitation, adopted a standard incorporating Rambus's technology. At a minimum, we would expect the members to have confronted Rambus and demanded RAND terms (even if, as Rambus argues, its technology was so superior that JEDEC had no choice but to adopt it).[359]

Rambus's own documents evince the belief that it had kept secret its patent position relative to JEDEC's standards. In August 1997, Rambus CEO

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bus Royalty" as a "Cost Adder." CX 2303 at 16. And Hyundai's April 1999 presentation to the PC Platform APAC Technology Forum contrasts the benefits of DDR SDRAM's open standard with the negative impact of RDRAM's royalty cost. CX 2334 at 25, 27.

[356] CX 2442 at 36. Although Rambus cites a 1997 internal Micron e-mail as evidence that an Intel employee had told Micron's Intel account representative that Rambus might claim patent coverage over DDR SDRAM, Micron regarded the rumor as "typical" of "misinformation" and "overstatements" that were circulating in advance of Rambus's initial public offering and did not credit it. *See* Lee, Tr. 6700-10, discussing RX 920 at 1-2.

[357] *See supra* note 322 and accompanying text.

[358] *See infra* notes 404-408 and accompanying text.

[359] *See infra* Section IV.C.3.b. (concluding that Rambus has not demonstrated its claims of superior technology).

Tate remarked, "[W]e already have the 327 patent but few people are aware of what it means," continuing, "[O]ur policy so far has been NOT to publicize our patents and I think we should continue with this."[360] In May 1999, Rambus Intellectual Property Vice President Karp surmised, "They probably think they avoid our IP if they don't go 'packet based.'"[361] In November 1999, Rambus named its IP initiative "Lexington 'The Shot Heard Around the World,'"[362] which Karp thought fitting because, "We fully anticipated at that point that once people became aware that we had IP covering sync DRAM, DDR, that it was going to make some noise."[363] Even in December 1999 Tate was still directing that, if asked whether DDR SDRAM infringes Rambus IP, "it's important NOT to indicate/hint/wink/etc what we expect the results of our [infringement] analysis to be!!!"[364]

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We find nothing in the record to suggest that, in the cooperative environment prevailing at JEDEC, the incidents to which the ALJ and Rambus have pointed were sufficient to put JEDEC members on notice that Rambus would pursue a deceptive course of conduct to obtain patents covering JEDEC's standards, then engage in patent hold-up to extract royalties on terms of Rambus's choosing.

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[360] CX 942; *see also* CX 919; CX 987 at 4.

[361] CX 1069 (commenting on an article entitled "Industry group will push DDR DRAMs").

[362] CX 5002 (designated R401047).

[363] CX 5069 at 54 (deposition transcript at 563) (Karp 2004 *Infineon* Dep.).

[364] CX 1089.

4. Rambus's Conduct Was Deceptive

JEDEC's policies (fairly read) and practices, as well as the actions of JEDEC participants, provide a basis for the expectation that JEDEC's standard-setting activity would be conducted cooperatively and that members would not try to distort the process by acting deceptively with respect to the patents they possessed or expected to possess. Those policies rested on an express duty of good faith, as well as an objective of avoiding creation of unnecessary competitive advantages. The policies also included rules to ensure that members periodically were reminded to disclose patents and patent applications, and that patented technologies would be included in standards only after receipt of RAND assurances. JEDEC thus presented the type of consensus-oriented environment in which deception is most likely to contribute to competitive harm.

JEDEC's members expected disclosure of both patents and patent applications that might be applicable to the work JEDEC was undertaking, if the patents ever were going to be enforced against JEDEC-compliant products. These expectations were fostered by JEDEC's policies and were reflected by the behavior and understandings of JEDEC participants. Rambus's own descriptions of its understanding of the SSO's objectives and requirements reinforce that conclusion.

Rambus's course of conduct played on these expectations. Rambus sat silently when other members discussed and adopted technologies that became subject to Rambus's evolving patent claims. Rambus voted and commented on inclusion of programmable CAS latency and burst length without revealing that it was seeking patent coverage of those technologies,

despite language on the ballot that called for disclosure of relevant patents. Rambus twice evaded direct questions about its patent portfolio, coupling a nonresponsive answer with a reminder that it previously had disclosed a patent (which lacked any claims then relevant to JEDEC's work). Rambus even provided JEDEC with a list of its patents that omitted the one patent Rambus believed covered JEDEC's work.

At the same time that Rambus was avoiding disclosure of its patent activity, Rambus was engaged in a program of amending its applications to develop a patent portfolio that would cover JEDEC's standards. Rambus made full use of information gleaned from its JEDEC participation to accomplish this objective. Rambus's JEDEC representative was charged with overseeing development of patent claims that would provide better coverage of products compliant with JEDEC's SDRAM standards, and Rambus's CEO asked for progress reports on claims that would cover the JEDEC standards.

Rambus argues that amending patent applications based on competitive information is a legitimate business practice condoned by the patent laws.[365] Rambus cites *Kingsdown Medical Consultants, Ltd. v. Hollister, Inc.*[366] and its progeny as establishing that there is nothing improper in amending claims to cover a competitor's product that the applicant learns about during the patent prosecution process. The cases relied upon by Rambus find no impediment, from a *patent law* perspective, to prosecuting or enforcing a claim developed under those circum-

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[365] RB at 89-91.

[366] 863 F.2d 867 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989).

stances.[367] These cases do not, however, involve either facts or law relevant here. None considers how the applicant learned of the competing product, or whether the applicant used that information in ways inconsistent with the understandings of other participants in a cooperative standard-setting environment. None of those cases examines the competitive consequences of the conduct.

In contrast, our concern in this proceeding is harm to competition, not to the patent system. Here, Rambus used information gained through participation in cooperative JEDEC processes by tailoring its patent claims to facilitate hold-up, while deceiving other JEDEC members regarding its patent position. The abuse of industrywide standard-setting efforts, and the competitive harms that may ensue, were not at issue in the cases cited by Rambus – but these factors are central to determining whether Rambus's actions constituted exclusionary conduct.

We find that Rambus's course of conduct constituted deception under Section 5 of the FTC Act. Rambus's conduct was calculated to mislead JEDEC members by fostering the belief that Rambus neither had, nor was seeking, relevant patents that would be enforced against JEDEC-compliant products. Rambus's silence, in the face of members' expectations of disclosure, created a misimpression that Rambus would not obtain and/or enforce such patents. When

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[367] *See, e.g., Kingsdown*, 863 F.2d at 869, 872, 874 (considering a patent applicant's actions in terms of the "deceitful intent" element of purported "inequitable conduct before the [PTO]"); Emerson Electric Co. v. Spartan Tool, LLC, 223 F.Supp. 2d 856 (N.D. Ohio 2002) (refusing to infer that an applicant had deceived the patent examiner by amending a claim without highlighting all ramifications of the change).

suspicions arose, Rambus allayed them with the reminder that it had made a prior disclosure. The message that Rambus reasonably conveyed – in a context in which it had been asked about its patent position, and in which other members expected disclosure of patents and applications – was that Rambus would have disclosed if it had had anything relevant to reveal. Even Rambus's withdrawal letter misleadingly conveyed the impression that it was listing its issued patents, while failing to disclose the one patent that might have mattered to the other JEDEC members. Under the circumstances, JEDEC members acted reasonably when they relied on Rambus's actions and omissions and adopted the SDRAM and DDR SDRAM standards.

Rambus withheld information that would have been highly material to the standard-setting process within JEDEC. JEDEC expressly sought information about patents to enable its members to make informed decisions about which technologies to adopt, and JEDEC members viewed early knowledge of potential patent consequences as vital for avoiding patent hold-up. Rambus understood that knowledge of its evolving patent position would be material to JEDEC's choices, and avoided disclosure for that very reason.[368] We thus find that Rambus engaged in representations, omissions, and practices that were likely to mislead JEDEC members acting reasonably under the circumstances, to their substantial detriment, and we conclude that Rambus intentionally and willfully engaged in deceptive conduct.

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[368] Rambus now argues that disclosure would not have changed JEDEC's decision because of the superiority of Rambus's technologies. We address that argument *infra* in Section IV.C.3.b.

As discussed in detail in Sections IV.B. and IV.C. below, Rambus's course of deceptive conduct contributed significantly to Rambus's acquisition of monopoly power by distorting JEDEC's technology choices and undermining JEDEC members' ability to protect themselves against patent hold-up. This conduct caused harm to competition. In sum, the record establishes a *prima facie* case that Rambus engaged in exclusionary conduct.

5. Rambus's Procompetitive Justification for its Conduct

Our finding that Complaint Counsel established a *prima facie* case of exclusionary conduct shifts the burden to Rambus to establish a nonpretextual, procompetitive justification for its conduct.[369] Rambus must prove "that its conduct is indeed a form of competition on the merits because it involves, for example, greater efficiency or enhanced consumer appeal."[370]

Deceptive conduct is extraordinarily difficult to justify.[371] Rambus tries to avoid this challenge by characterizing its conduct as a refusal to deal with its

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[369] A respondent may rebut a *prima facie* case of exclusionary conduct by introducing evidence of a procompetitive justification for its actions. *See* United States v. Microsoft Corp., 253 F.3d 34, 59 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001).

[370] *See id.* For example, the D.C. Circuit found that Microsoft had "valid technical reasons" to cause its Windows operating system to ignore user-chosen browser defaults in certain circumstances. The court then found that the plaintiffs had failed either to rebut that justification or to demonstrate that the anticompetitive effect of the challenged action outweighed it. *Id.* at 67.

[371] *Id.* at 77 ("[u]nsurprisingly, Microsoft offers no procompetitive explanation for its campaign to deceive developers.")

competitors or a failure to "share its trade secrets with others."[372] Rambus then defends its conduct on the grounds that it preserved the secrecy of Rambus's patent applications, which contained confidential information about Rambus's inventions.[373] Rambus's characterization ignores much of its deceptive course of conduct, as well as the context in which that conduct occurred.

As discussed above, Rambus engaged in a deliberate course of deceptive conduct that included selective omissions and outright misrepresentations relating to its intellectual property.[374] Indeed, Rambus used information obtained via its participation in JEDEC to help shape and refine the very patent applications it now claims it was seeking to protect.[375] Rambus's supposed desire to maintain the secrecy of its intellectual property does not justify the totality of its deceptive conduct in the standard-setting context.

We weigh Rambus's justification in the context of its conduct. In the competitive marketplace, companies generally are justified in choosing not to disclose or share their unpublished patent applications and trade secrets.[376] The ALJ (and Rambus), citing Rambus's patent law expert, found three reasons why, in a competitive context, the non-disclosure of this information serves legitimate and procompetitive pur-

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[372] RB at 113.

[373] *See* RB at 86-88, 114-15.

[374] *See supra* Section IV.A.

[375] *Id.*

[376] The PTO held patent applications in confidence during the period that Rambus belonged to JEDEC. In 1999, the law changed to require publication of most patent applications 18 months after filing. 35 U.S.C. § 122.

poses.[377] However valid these justifications might be in the abstract – or when applied within a competitive marketplace – they do not fit the record facts or the context that existed here. Further, if protecting trade secrets was critical to Rambus, it had the option to refrain from participating in JEDEC.

First, Rambus argued that withholding of information was justified because disclosure of that information "shows which inventions the applicant is seeking to protect, and thus reveals both technical information and the applicant's business strategies." Preserving trade secrets by preventing access by rivals in a competitive marketplace often may be procompetitive, particularly when that information is not otherwise protected from free-riding by those rivals. However, the technical information comprising Rambus's inventions (as opposed to its intentions to claim that those inventions covered technologies in JEDEC's DRAM standards – which, as discussed above,[378] could not be divined until the ultimate claims became public) already had been disclosed with publication of the written descriptions of the inventions in the PCT application and the '703 patent. Morever, Rambus has claimed in its numerous infringement actions that the patent laws provide full protection against unlicensed use of its technical inventions, at least for periods after Rambus's patents issued.

It is true that if Rambus had disclosed its relevant patent applications to JEDEC members, the disclosure might have exposed Rambus's business strategy to obtain patents covering JEDEC's DRAM stan-

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[377] ID at 288-89; RB at 87.

[378] *See supra* notes 328-338 and accompanying text.

dards – but Rambus does not explain how keeping that strategy secret would be procompetitive given the cooperative atmosphere of the SSO. To the contrary, disclosure would have enabled other participants in the standard-setting process to make their decisions based on knowledge that Rambus's business strategy was to enforce its patents and demand royalties if they were incorporated in standards adopted by JEDEC. As one treatise summarizes, withholding information as to the existence of patent applications in such a setting "would be most valuable as a tool for deception."[379]

Second, Rambus argued that disclosure "could jeopardize the applicant's ability to obtain foreign patents" by "enabl[ing] a competitor to win the 'race'" to foreign patent offices, most of which have "a 'first to file' rule."[380] But under typical first-to-file rules, patents go to the first *inventor* to file.[381] If a competi-

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[379] II HOVENKAMP ET AL., IP AND ANTITRUST § 35.5 at 35-40 n. 17.11 (2006 Supp.).

[380] RB at 87_88.

[381] *See* Gerald J. Mossinghoff, *The First-To-Invent Rule in the U.S. Patent System has Provided No Advantage to Small Entities*, 87 J. PAT. & TRADEMARK OFF. SOC'Y 514 (2005) ("As between two true inventors claiming the same invention – as contrasted to copiers – *every* nation in the world, except the United States, grants the patent to the inventor who first undertakes to use the patent system . . . . In shorthand, this is called a first-to-file system of priority, but it is more appropriately called a first-inventor-to-file system.") (emphasis original); MARTIN J. ADELMAN *et al.*, CASES AND MATERIALS ON PATENT LAW 160 (2003) (under a first-to-file system, "the *inventor* who first files a patent application obtains the patent, even if another actually invented the technology first") (emphasis added); Fliesler, Tr. 8839 (explaining the first-to-file race in terms of "*inventor* A and *inventor* B who are conceiving and reducing to practice and

tor merely read or heard Rambus's disclosure, copied its application, and filed first in a foreign jurisdiction, the competitor would not have invented the technology and would not be entitled to a patent.[382] Rambus failed to identify any foreign jurisdiction in which its ability to obtain patent protection would have been threatened by disclosures within JEDEC. Under these circumstances, and on this record, the only effect of Rambus's behavior was to prevent JEDEC participants – who expected Rambus to conduct itself cooperatively and without deception – from making their standard-setting decisions with knowledge of the consequences. That is not procompetitive.

Third, we are not persuaded that Rambus's nondisclosure of its patent applications was justified because disclosure "may enable a competitor to slow down or interfere with the patent application process," such as by "enabl[ing] a competitor to provoke an 'interference' at the Patent Office by claiming the same invention in one of the competitor's applications."[383] This, too, is a hypothetical justification. There is no evidence in this record that Rambus's patent position in the United States or elsewhere would have been jeopardized in that fashion.

Finally, Rambus cites Crisp's trial testimony and an e-mail he sent to Rambus executives to support its claim regarding the protection of trade secrets.[384] Crisp testified that Rambus's outside patent counsel

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working independently, but simultaneously on the same invention") (emphasis added).

[382] *See* Fliesler, Tr. 8839 (the first one to file "that is otherwise entitled to a patent" prevails).

[383] RB at 87.

[384] *See id.* at 49-50, 98-99.

advised him that patent applications should be confidential; however, Crisp did not state that counsel's advice was tied to Rambus's course of conduct in the JEDEC standard-setting context.[385] Moreover, although Crisp's e-mail mentioned the desirability "of not disclosing our trade secrets any earlier than we are forced to," the context suggested that this comment reflected Rambus's desire for leverage over its customers.[386] There is abundant additional evidence in the record that Rambus's conduct was motivated by a desire to anticompetitively bias the standard-setting process.[387] In short, there is nothing to support Rambus's claim except the claim itself.

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We find that Rambus did not carry its burden of establishing that its conduct served procompetitive purposes. The record establishes that the purpose and effect of Rambus's deceptive conduct was to manipulate the standard-setting process at JEDEC and gain market power. Furthermore, even if we were to credit Rambus's proffered justification, we find that it

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[385] Crisp, Tr. 3473, 3495-96. Other, more specific advice from Rambus counsel (Diepenbrock as well as Vincent) identified the equitable estoppel risks associated with Rambus's JEDEC membership. *See* CX 837 at 1; CX 1942; CX 3125 at 320-21 (Vincent *Infineon* Dep.) (*in camera*).

[386] Crisp's same e-mail also referenced the need "to get the necessary amendments completed [and] the new claims added," and "make damn sure the ship is watertight," before making disclosures. *See* CX 837 at 2.

[387] *See, e.g.*, CX 711at 73 ("it makes no sense to alert them to a potential problem they can easily work around."); CX 919 ("do *NOT* tell customers/partners that we feel DDR may infringe – our leverage is better to wait."); CX 1277a at 2 ("do not tell them :-").

would not outweigh the anticompetitive effects of Rambus's exclusionary conduct, particularly in light of the potential to distort industrywide standard setting.

B. Possession of Monopoly Power

Monopoly power may be established either by direct evidence of such power – *i.e.*, the power to raise price above competitive levels or to exclude competition – or by indirect evidence, such as a high market share in a properly defined relevant market with high barriers to entry.[388] In order to support a Section 2 violation, such monopoly power must be durable. When barriers to entry are low, any attempt to exercise monopoly power (even by a firm with 100 percent market share) quickly would be countered by competition from new entrants.[389]

As discussed above,[390] the alleged relevant product markets involve technologies that are incorporated in DRAM for use in current and recent-generation elec-

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[388] *See, e.g.*, United States v. Dentsply Int'l, Inc., 399 F.3d 181, 187 (3d Cir. 2005) ("monopoly power may be inferred from a predominant share of the market"); United States v. Microsoft Corp., 253 F.3d 34, 51 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001) ("monopoly power may be inferred from a firm's possession of a dominant share of a relevant market that is protected by entry barriers").

[389] *See, e.g.*, Tops Markets, Inc. v. Quality Markets, Inc., 142 F.3d 90, 99 (2d Cir. 1998) ("We cannot be blinded by market share figures and ignore market place realities, such as the relative ease of competitive entry"); United States v. Syufy Enters., 903 F.2d 659, 665-66 (9th Cir. 1990) ("In evaluating monopoly power, it is not market share that counts, but the ability to *maintain* market share.").

[390] *See supra* Section II.A.

tronic memory devices.[391] The four alleged relevant technology markets are: (1) the latency technology market; (2) the burst length technology market; (3) the data acceleration technology market; and (4) the clock synchronization technology market. With respect to each of these four technology markets, the product market comprises alternative technologies available to address a given technical issue arising in the course of DRAM design.[392] The alleged relevant geographic market for each of these four technologies is the world.[393] Rambus accepts these market definitions.[394]

Rambus held over 90 percent of the market share in the relevant markets.[395] JEDEC's standards have

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[391] IDF 1010-15.

[392] The Initial Decision also identifies a "cluster market" for synchronous DRAM technologies, which contains these four product markets. IDF 1014. In view of our findings regarding the four separate product markets, we need not separately consider the cluster market.

[393] IDF 1016-17. *See* IDF 1017 ("The relevant geographic market for each relevant product market is the world because: buyers of technology typically do not care about the geographic source of technology; technologies tend to be licensed worldwide; technologies tend to flow across national borders; downstream products are produced and used worldwide; and transportation costs of both technology and DRAMs are negligible.").

[394] *See* IDF 1013, 1015 ("Respondent does not challenge Complaint Counsel's product market definitions. Respondent's economic expert . . . testified the 'relevant market is not crucial to understanding competition and market power in this setting.'").

[395] *See* IDF 1020-21; CX 1386 at 4 ("We are on the cusp of achieving our original BHAG [Big Hairy Audacious Goal] • SDRAM + DDR + RDRAM > > 90% of the DRAM market"); CX 2112 at 310-11 (deposition transcript at 309-10) (Mooring FTC Dep.); McAfee, Tr. 7430 (testifying that the percentage of

been ubiquitous in the computer industry: from 1998 on, the decided majority of DRAMs sold have complied with the JEDEC SDRAM and DDR SDRAM standards.[396] Rambus claims that its patents are necessary to make, use, or sell DRAMs that comply with the JEDEC standards.[397] Courts typically find such a high market share sufficient to infer the existence of monopoly power.[398] The ALJ determined that Rambus possessed monopoly power in the four key technology markets alleged, and Rambus does not dispute his findings in this respect.[399] We reach the same

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worldwide commercial DRAM production exposed to Rambus's patent claims was "in the upper nineties").

[396] *See* CX 35 at 14-15 ("This JEDEC standardization process creates the structure from which all DRAM designs begin . . . JEDEC is the fulcrum for DRAM standards in Asia, the Americas and Europe").

[397] CX 2067 at 171 (Davidow *Infineon* Dep.) (*in camera*) ("Q. So am I right, then that it's Rambus's position [] that any SDRAM or RDRAM being used in main memory PCs today [January 31, 2001] are covered by their patents? . . . [A.] I would say that it is highly likely that is true."); McAfee, Tr. 7427-28 ("JEDEC standards have dominated the DRAM industry"), 7432-33; Rapp, Tr. 10248-49 (presenting market share statistics).

[398] *See* Eastman Kodak Co. v. Image Technical Servs. 504 U.S. 451, 481 (1992) (80% market share, with no readily available substitutes, sufficient to survive summary judgment on the possession of monopoly power); United States v. Grinnell Corp., 384 U.S. 563, 571 (1966) (87% of the relevant market left no doubt that defendants had monopoly power); United States v. E.I. du Pont de Nemours & Co., 351 U.S. 377, 379, 391 (1956) (control of 75% of a relevant market would constitute monopoly power); American Tobacco Co. v. United States, 328 U.S. 781, 797 (1946) (control of over two-thirds of the market is a monopoly).

[399] "Complaint Counsel have demonstrated that Respondent has monopoly power in the relevant markets." IDF at 252; *see also* IDF 1010-15. Rambus's economic expert, Rapp, testified

conclusion, and find that Rambus did acquire a monopoly position.

Rambus argues, however, that its monopoly power was not durable because the industry could have switched to alternative technologies relatively easily without incurring significant additional costs. We must therefore determine whether Rambus's deceptive and exclusionary conduct in the standard-setting context enabled Rambus to acquire durable monopoly power. We address that question below, as part of our broader analysis of causation issues.[400]

C. Causation

Having concluded that Rambus engaged in a deceptive course of conduct that constituted exclusionary conduct, and having found that Rambus acquired a monopoly position in the relevant markets, we turn to the critical issue of causation – *i.e.*, whether Rambus's exclusionary conduct was linked to its monopoly position.

We find that the same evidence establishing that Rambus engaged in exclusionary conduct and that it acquired monopoly power respecting the four key technologies incorporated into JEDEC's SDRAM standards contributes to a *prima facie* showing of a causal link between Rambus's conduct and its power. More specifically, we conclude that the evidence (1) links Rambus's conduct to JEDEC's adoption of SDRAM standards incorporating Rambus's patents

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that Rambus possessed market power. Rapp, Tr. 10046 ("[I]t is the case isn't it, that, in your view, Rambus today possesses market power in each of the relevant markets defined by [Complaint Counsel's expert] Professor McAfee? A. Yes.").

[400] *See especially infra* Section IV.C.3.d. (discussion of lock-in).

and (2) links JEDEC's adoption of those standards to Rambus's acquisition of monopoly power.

1. Link between Rambus's Conduct and JEDEC's Standard-Setting Decisions

Rambus's strategy was to cause JEDEC to adopt SDRAM and DDR SDRAM standards incorporating its patents, and then to charge those practicing the standards royalties of its choosing. Although purpose is not a substitute for effect in a monopolization case, it is well-settled that "[e]vidence of the intent behind the conduct of a monopolist is relevant . . . to the extent it helps us understand the likely effect of the monopolist's conduct."[401] As the Supreme Court explained, "[K]nowledge of intent may help the court to interpret facts and to predict consequences."[402] Thus, we initially infer from the evidence respecting Rambus's purpose that, but for Rambus's deceptive course of conduct, JEDEC either would have excluded Rambus's patented technologies from the JEDEC DRAM standards, or would have demanded RAND assurances, with an opportunity for *ex ante* licensing negotiations. Indeed, the one time that JEDEC members had advance knowledge that a Rambus patent was likely to cover a standard under consideration, the

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[401] United States v. Microsoft Corp., 253 F.3d 34, 59 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001).

[402] Chicago Board of Trade v. United States, 246 U.S. 213, 238 (1918). *See also* United States Football League v. NFL, 842 F.2d 1335, 1359 (2d Cir. 1988) ("Evidence of intent *and* effect helps the trier of fact to evaluate the actual effect of challenged business practices in light of the intent of those who resort to such practices.") (emphasis original).

members took deliberate steps to avoid standardizing the Rambus technology.[403]

JEDEC members – DRAM manufacturers and customers – were highly sensitive to costs, and that keeping costs down was a major concern within JEDEC.[404] As a report by Rambus's Crisp put it, "Compaq (Dave Wooten) like the others, stressed that price was the major concern for all of their systems. They didn't particularly seem to care if the SDRAMs had 1 or two banks so long as they didn't cost any more than conventional DRAMs . . . Sun echoed the

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[403] In March 1997, when NEC proposed a "loop-back" clock system, some members expressed concern that it might be covered by Rambus's '703 patent, the one patent that Rambus had disclosed while it was a member of JEDEC. JX 36 at 7. The JEDEC committee immediately dropped the proposal and turned to consideration of technologies that it believed avoided Rambus's patent. *See* Rhoden, Tr. 527-28; Lee, Tr. 6695-96; CX 368 at 2.

[404] *See, e.g.*, G. Kelley, Tr. 2562 ("The overriding factor on all of my votes on DRAM was low cost"); Bechtelsheim, Tr. 5814 (JEDEC's "overarching goal" was "a cost-effective solution" for memory interfaces); CX 2107 at 136-37 (Oh FTC Dep.) (*in camera*) (avoiding costs, including royalties or fees, was important to Hyundai); CX 34 at 31 (IBM: "LOW COST!!! (<5% more than [previous-generation] DRAM)"); CX 711 at 1 (Crisp e-mail reporting, "Desi [Rhoden of Advanced Memory International (AMI-2)] added that if the SDRAM doesn't cost less than 5% more than [previous generation] DRAM they will not be used"); CX 2383 (Sun letter to JEDEC members stating, "[S]ince we are very cost conscious we are willing to drop features that add too much cost or complexity"); CX 2777 (Micron: "[T]he age old rule for DRAMs still appl[ies]. Customers will take as much performance as we can give them for absolutely no added cost over the previous technology. They will not pay extra for increased DRAM performance."). An October 1994 internal Rambus e-mail summarized, "Our industry is very cost sensitive." CX 5109 at 4.

concerns about low cost. They really hammered on that point."[405] More succinctly, Crisp explained, "[T]hey want cheap, cheap, cheap."[406]

JEDEC members considered the potential cost of patents in weighing different alternatives. Witnesses, including representatives from DRAM manufacturers and their major customers, testified that knowledge of patents was an important factor in their decisions as JEDEC members.[407] For example, after testifying that the potential for royalty-bearing patents would have been relevant in analyzing programmable CAS latency and programmable burst length as compared to alternatives, Andreas Bechtelsheim added, "I personally and Sun [Microsystems] as a company would have strongly opposed the use of

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[405] CX 1708 at 2.

[406] CX 711 at 34 (explaining that "customers are willing to leave performance on the table in exchange for having lower cost systems").

[407] *See, e.g.*, Sussman, Tr. 1417 (Sanyo's JEDEC representative testifying, "If I understood that there was IP on the programmable, I would have voted - changed my direction and voted to take the fixed one."); Landgraf, Tr. 1714 (HP's JEDEC representative testifying that if Rambus had disclosed its patent applications, "If we knew in advance that they were not going to comply with the JEDEC patent policy, we would have voted against it."); G. Kelley, Tr. 2576 (IBM's JEDEC representative noting that "[p]atent issues are a concern on every JEDEC proposal" and that when a technology was considered for the first time "it was especially valuable to have the consideration of patents so that we could possibly avoid them"); Lee, Tr. 6686, 6717 (knowledge of Rambus's patent applications would have caused Micron to oppose on-chip PLL/DLL and dual-edge clocking); *see also* JX 5 at 4 (JEDEC minutes stating, "The important thing is disclosure. If it is known that a company has a patent on a proposal then the Committee will be reluctant to approve it as a standard.").

royalty-bearing elements in an interface patent – in an interface specification."[408] The total cost of payments for Rambus's undisclosed patents could amount to several billion dollars,[409] with some individual DRAM manufacturers each paying hundreds of million of dollars.[410] Numbers of this magnitude are not easily overlooked.

Alternative technologies were available when JEDEC chose the Rambus technologies, and could have been substituted for the Rambus technologies had Rambus disclosed its patent position.[411] Some of

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[408] Bechtelsheim, Tr., 5813-14. JEDEC members' response to Rambus's proprietary RDRAM technology reflected similar cost sensitivity. *See, e.g.*, JX 36 at 7 ("Some Committee members did not feel that the Rambus patent license fee fit the JEDEC requirement of being reasonable."); CX 961 at 1 (September 1997 Intel e-mail to Rambus CEO Tate stating the concern that, for at least the low end of the market, "absolute cost is the critical factor" and alternatives "need not be equivalent performance" and warning that, upon analyzing the royalty obligations attached to RDRAM, the industry would develop alternatives); RX 1482 at 12.

[409] *See* McAfee, Tr. 7653-54 (*in camera*) (estimating royalty payments to Rambus of $600 million per year); CX 527 at 1 (*in camera*) (projecting annual Rambus royalty revenue on SDRAM and DDR SDRAM of $2.1 billion dollars by 2005); CX 1391 at 32 (*in camera*) (suggesting that Rambus DRAM royalties could total more than $8 billion over the six years between 2000 and 2005); CX 1401 at 10 (*in camera*) (Rambus business plan projecting that DDR SDRAM royalties in 2005 would range from several hundred million dollars up to as much as $2.5 billion).

[410] *See* Appleton, Tr. 6390-92 (Rambus's requested royalty would cost Micron hundreds of millions of dollars; Rambus royalties would be the equivalent of 25-50% of Micron's R&D expenditures).

[411] *See, e.g.*, G. Kelley, Tr. 2548-49 and Jacob, Tr. 5370-93 (alternatives to programmable CAS latency); Kellogg, Tr. 5110-11, 5131-32 and Jacob, Tr. 5397-5412 (alternatives to programma-

the major firms in the industry found these alternatives viable, and even preferable.[412] JEDEC members – the principal buyers of the relevant technologies – gave these alternatives serious, searching consideration; in fact, the technologies as to which Rambus subsequently revealed patent claims sometimes were chosen only after prolonged debate.[413]

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ble burst length); Jacob, Tr. 5416-38 (alternatives to dual-edge clocking); Jacob, Tr. 5443-58 and Lee, Tr. 6655, 6664-67, 6676-78 (alternatives to on-chip PLL/DLL). *See generally* Bechtelsheim, Tr. 5786 ("in typical design activity one can make any number of choices, including choosing an interface that was not encumbered by a patent or royalty").

[412] For example, Samsung advocated the use of fixed, rather than programmable, CAS latency, JX 10 at 71; Rhoden, Tr. 425-27; Kellogg, Tr. 5099-100, and Cray proposed the use of fuses to set latency, CX 34 at 149, Kellogg, Tr. 5104. For setting burst length, Cray proposed using fuses, CX 34 at 149; Sussman, Tr. 1388-89; Kellogg, Tr. 5103-05, and Mitsubishi proposed using pins. Rhoden, Tr. 430-34; Kellogg, Tr. 5102; JX 10 at 5, 74. Samsung proposed fixed, rather than programmable, burst length. Rhoden, Tr. 425-27; JX 10 at 71. With regard to data acceleration, TI proposed doubling the frequency of a single-edge clock in place of dual-edge clocking. Lee, Tr. 6711-14; CX 371 at 3. As alternatives to on-chip PLL/DLL, Samsung proposed placing a single PLL on the memory controller, Rhoden, Tr, 513-14; Lee, Tr. 6691; JX 31 at 71; IBM proposed using vernier circuits, Kellogg, Tr. 5155; and Micron proposed using what it termed an "echo clock," Lee, Tr. 6655-56; 6664-67; JX 29 at 4, 17-22. Both Micron and Silicon Graphics also presented proposals for using data strobes in place of on-chip DLLs. CX 368 at 1-2, 4; CX 370 at 2-3; Lee, Tr. 6666-67, 6682-83.

[413] As to CAS latency and burst length, NEC/Sanyo's Sussman testified, "I had a lot of arguing to do to get the degree of programmable features into the part." Sussman, Tr. 1380. AMI-2's Rhoden explained that using fuses to set CAS latency and burst length "was one of the options that was considered for a very long time, until we finally settled on the [programmable] register." Rhoden, Tr. 429-30. Subsequently, sentiment for moving

The ALJ rejected this evidence regarding JEDEC's cost sensitivity and technology debates because, in his opinion, it was based on "the subjective perceptions of JEDEC members at the time," reasoning that while it "may speak to whether JEDEC would have selected a [substitute] technology, it does not go to whether an alternative is equal or superior in objective terms."[414]

The ALJ's analysis misses the point of the causation inquiry. Evidence that a properly-informed JEDEC may have selected a substitute technology

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to fixed CAS latency and burst length remained strong: the SDRAM Lite task group proposals for reducing the cost of SDRAM included fixed CAS latency and burst length. *See* Rhoden, Tr., 475-76; Lee, Tr. 6626. Indeed, results of the SDRAM Lite survey ballot announced in January 1996 showed consensus support for fixed CAS latency of three and for fixed burst length of four, but no consensus for an additional latency or burst length. *See* Lee, Tr. 6627-32; JX 29 at 13-15.

Dual-edged clocking held only "mixed support" within JEDEC. JX28 at 35 (results of 1995 survey ballot). (This confirms a 1991 report from NEC's Sussman, finding a split between those who preferred high-speed, single-edge clocking and those who preferred dual-edge clocking at lower speeds. *See* Sussman, Tr. 1368-72; CX 20 at 1.) Debate over on-chip PLL/DLL reflected "differing viewpoints," with some JEDEC members preferring to use a data strobe and finding on-chip PLL/DLL unnecessary, but others wanting the latter feature; the result was "a compromise . . . to do both but provide the ability to turn off the DLL." *See* Lee, Tr. 6682-83; Sussman, Tr. 1404 (summarizing the on-chip PLL/DLL debate, "Ten engineers; 12 opinions."). *See also* CX 2713 at 2 and Lee, Tr. 6654 (1997 Micron e-mail arguing to JC 42.3 members that on-chip DLL has "more disadvantages than advantages" and should be eliminated); MacWilliams, Tr. 4918-20 (Intel study found on-chip DLL unnecessary at speeds under consideration).

[414] ID at 317.

suggests a causal link between Rambus's deceptive course of conduct and JEDEC's decision-making process. This evidence – combined with the evidence of Rambus's strategy, JEDEC members' overriding concern with costs, and the magnitude of the potential royalties in the absence of RAND assurances or the opportunity to negotiate *ex ante* – is enough to show that JEDEC's adoption of the SDRAM and DDR SDRAM standards was linked to Rambus's exclusionary conduct.

2. Link Between JEDEC's Standards and Rambus's Monopoly Power

JEDEC's adoption of standards incorporating Rambus's patented technologies is linked to Rambus's monopoly power. More specifically, as previously stated, the record shows: (1) that Rambus claims that its patents are necessary to make, use, or sell DRAMs that comply with the JEDEC standards; (2) that most DRAMs sold complied with the JEDEC SDRAM and DDR SDRAM standards;[415] and (3) that

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[415] In each year from 1994 through 2002, products compliant with JEDEC standards captured between 87-97% of DRAM revenues. *See* Rapp, Tr. 10099-100, 10248-49; Prince, Tr. 9020-21; CX 2112 at 310-11 (deposition transcript at 309-10) (Mooring FTC Dep.) (*in camera*). Rambus argues that multiple DRAM standards may and do exist at any given time, but almost without exception, the "multiple standards" in the market have been succeeding generations of JEDEC standards. *See* Rapp, Tr. 10248-49. Only with RDRAM in 2001-02 did any non-JEDEC-compliant DRAMs capture more than 3% of revenues. *Id.* Indeed, customers expressed reluctance to purchase anything other than JEDEC-compliant DRAMs for commodity applications. Rambus President Mooring, for example, testified that HP, Apple, and Sun all told him in 1991 that "we only use memories approved by JEDEC." CX 2054 at 47-48 (Mooring *Infineon* Dep.) (*in camera*). "[I]n the DRAM business, the only standard is JEDEC." CX 2079 at 118 (Mooring *Micron* Dep.) (*in*

Rambus acquired 90 percent market shares in all four of the relevant markets.[416]

These market results were a natural consequence of DRAM industry attributes. In part, the results reflected the nature and composition of JEDEC, a broad-based organization that included essentially all the DRAM manufacturers and their largest customers.[417] Once JEDEC reached a consensus as to which technologies to standardize, it is hardly surprising that those same manufacturers produced, and those same customers bought, products conforming to the standard they had adopted.[418]

The market results also reflected the nature of the DRAM product itself, which drove standardization in the DRAM industry. DRAMs must interoperate with complementary components, which provided a compelling incentive to develop DRAM specifications that ensured compatibility.[419] JEDEC provided the neces-

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camera). *See also* Becker, Tr. 1152-53 (Infineon makes only JEDEC-compliant DRAMS because "that's all our customers are willing to buy").

[416] *See supra* Section IV.B.

[417] *See* Rhoden, Tr. 293-94; Peisl, Tr. 4453; JX 18 at 1-3.

[418] *See* Rhoden, Tr. 297-98 ("working with the customer inside an area like JEDEC . . . when everyone agrees, then they have essentially an automatic market . . . basically a presold customer base just by complying and working with the standard"); Macri, Tr. 4596.

[419] *See, e.g.*, Williams, Tr. 763 (Micron's customers "require that they are able to buy products from multiple sources and that these products interoperate, and JEDEC is the body that sets those standards by which there [is] interoperability"); Calvin, Tr. 994; G. Kelley, Tr. 2387-88; Polzin, Tr. 3943-44 ("It was crucial that we had a common standard that would allow interoperability"), 3972; Peisl, Tr. 4382 (standards "enable[] essentially the whole industry to develop products that work together

sary mechanism for coordinating the evolution of DRAMs and their complements.[420] Moreover, customers desired a commodity DRAM market whereby multiple DRAM suppliers could supply interchangeable DRAMs; standardization made this possible.[421]

These considerations strongly suggest that the market was likely to coalesce around a standardized choice.[422] Joined with the historical record of the predominant market position of DRAMs compliant with the JEDEC standards, these industry attributes support our finding that JEDEC's choice of standards

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in more or less a predefined manner"), 4386, 4408-10; McAfee, Tr. 7189-90, 11218.

[420] *See, e.g.*, Calvin, Tr. 994; Polzin, Tr. 3946-47 ("JEDEC was the natural forum and process for resolving the numerous differences."); Peisl, Tr. 4410 ("You have to make sure that your part is fully compliant with all the specifications of the other chips. This is why everybody is working towards the JEDEC specification. That's the common denominator."); McAfee, Tr. 11301-02.

[421] *See, e.g.*, Rhoden, Tr. 298-99; Williams, Tr. 763; Becker, Tr. 1152-53 ("[customers like Dell, IBM, and Compaq] want to be able to buy my parts or Samsung's parts or Micron's parts and use them interchangeably, and through the standards process, they get that benefit"); Sussman, Tr. 1328; Landgraf, Tr. 1692-93; G. Kelley, Tr. 2387-88; Heye, Tr. 3641 ("Apple thought it was very, very important to have multiple suppliers"); Polzin, Tr. 3973; Peisl, Tr. 4408-10; Goodman, Tr. 6013; McAfee, Tr. 7225-26; Farmwald, Tr. 8296; CX 1354 at 5 (1999 Tate presentation stating, "Customers want multiple sourced, compatible DRAMs").

[422] *See* McAfee, Tr. 11228-29. Indeed, outside the litigation context, Rambus recognized this very point. *See* CX 533 at 9 (1989 RamBus Business Plan noting "[t]he DRAM industry's penchant for standardization)"; CX 1284 at 28 (1989 RamBus Technology Overview stating, "There is real value in having a world DRAM standard").

significantly contributed to Rambus's monopoly power.

3. Rambus's Claims That The Chain of Causation Was Broken

Rambus claims that its course of conduct and its acquisition of monopoly power cannot be linked for four principal reasons.

a. Rambus's Intel Claim

First, Rambus argues (and the ALJ agreed) that Intel's technology choices,[423] not any conduct in which Rambus engaged, caused the monopoly position Rambus enjoyed with respect to SDRAM technologies.[424] If we were to accept this conclusion, implicitly we would be assigning to Complaint Counsel the burden of proving that Rambus's conduct was the *sole* cause of Rambus's monopoly position. This is error as a matter of law.

Exclusionary conduct need not be the exclusive cause of the monopoly position. In an equitable en-

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[423] In late 1996, Intel announced that its future chipsets – the "gatekeeper" or "traffic cop" components that link CPUs with main memory – would support RDRAM exclusively. *See* IDF 1058; Crisp, Tr. 3432-33; Tabrizi, Tr. 9134-35; RX 1532 at 2. By March 1999, however, Intel determined that "a strategy that puts our chipset and value processor line dependent, solely on Rambus is no longer viable." CX 2527 at 2. In June 1999, Intel announced it might discontinue its exclusive support of RDRAM, and two months later, Intel confirmed that it would also support main memory compliant with JEDEC's SDRAM standard. Tabrizi, Tr. 9201-03; CX 1077; CX 2338 at 57 (*in camera*). By October 1999, Intel informed Rambus that it had "been forced to re-architect its chipset roadmap to accommodate additional SDRAM products." CX 2541 at 2; *see* CX 2540 at 1.

[424] RFF 1538-47; ID at 303-04. Rambus did not raise this argument in its appeal or rebuttal briefs to the Commission.

forcement action, it is sufficient that the exclusionary conduct "reasonably appear[s] capable of making a significant contribution to creating or maintaining monopoly power."[425] As Professors Areeda and Hovenkamp explain:

> [B]ecause monopoly will almost certainly be grounded in part in factors other than a particular exclusionary act, no government seriously concerned about the evil of monopoly would condition its intervention solely on a clear and genuine chain of causation from an exclusionary act to the presence of monopoly.[426]

Further, as the U.S. Court of Appeals for the District of Columbia Circuit reasoned in *Microsoft*, requiring Section 2 plaintiffs "to reconstruct the hypothetical marketplace absent a defendant's anti-competitive conduct would only encourage monopolists to take more and earlier anticompetitive action."[427]

Moreover, the record does not support Rambus's claim as a matter of fact. Intel first announced and then withdrew exclusive support for RDRAM, and RDRAM never became a major factor in the DRAM

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[425] United States v. Microsoft Corp., 253 F.3d 34, 79 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001), citing language currently appearing at III AREEDA & HOVENKAMP, ANTITRUST LAW, ¶ 651f at 83-84; *see also* Einer Elhauge, *Defining Better Monopolization Standards*, 56 STAN. L. REV. 253, 331-32 (2003).

[426] III AREEDA & HOVENKAMP, ANTITRUST LAW, ¶ 651f at 83. *See also Microsoft*, 253 F.3d at 79 (finding no case standing for the proposition that "as to § 2 *liability* in an equitable enforcement action, plaintiffs must present direct proof that a defendant's continued monopoly power is precisely attributable to its anticompetitive conduct") (emphasis original).

[427] *Microsoft*, 253 F.3d at 79.

market.[428] Intel, acting alone, did *not* successfully impart monopoly power on its temporarily anointed choice; nor was the withdrawal of its support the sole reason for the proliferation of SDRAM technologies. Rather, the record shows that JEDEC's standards captured the market. JEDEC adopted standards that included programmable CAS latency and burst length, dual-edged clocking, and on-chip DLL/PLL, and these technologies succeeded. JEDEC did not adopt other aspects of RDRAM, and they became insignificant. Thus, the record shows that JEDEC's adoption made the difference, and significantly contributed to Rambus's acquisition of monopoly power.

b. Rambus's Inevitability/Superiority Claim

Second, Rambus argues (and the ALJ agreed) that any monopoly power it obtained from the incorporation of its technologies into the JEDEC DRAM standards resulted from the superiority of Rambus's technology, not from its conduct. We also reject this claim. To begin with, Rambus and the ALJ assumed that Complaint Counsel had the burden of proof on this claim. That is error. As noted by Professors Areeda and Hovenkamp:

> In addition to proving [monopoly] power, the plaintiff generally has the burden of pleading, introducing evidence, and presumably proving by a preponderance of the evidence that anticompetitive behavior has contributed significantly to the

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[428] During the period of Intel's exclusive support, RDRAM accounted for .5% (in 1996), 1.3% (in 1997), 1.6% (in 1998), 1.1% (in 1999), and 3% (in 2000) of DRAM revenues. Rapp, Tr. 10248-49. Its share was 12.5% in 2001, *id.* at 10249, and then fell below 10% by 2002. CX 2112 at 309-10 (Mooring FTC Dep.) (*in camera*).

> achievement or maintenance of the monopoly. *The defendant may, of course, introduce its own proof of inevitability, superior skill*, or business justification...."[429]

The court in *Microsoft* essentially reached the same conclusion. There the plaintiff met its threshold burden by showing that Microsoft unlawfully had maintained its monopoly position by "engag[ing] in anticompetitive conduct that reasonably appear[s] capable of making a significant contribution to . . . maintaining monopoly power."[430] The court then inferred causation – ruling, in essence, that the plaintiff had met its burden without a particularized reconstruction of what would have occurred in the but-for world. Rather than requiring the plaintiff "to reconstruct the hypothetical marketplace absent a defendant's anticompetitive conduct," the court explained, "To some degree the defendant is made to suffer the uncertain consequences of its own undesirable conduct."[431]

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[429] III AREEDA & HOVENKAMP, ANTITRUST LAW, ¶ 650c at 69 (emphasis added).

[430] *Microsoft*, 253 F.3d at 79 (citation to Areeda & Hovenkamp treatise omitted).

[431] *Id.* *See also* Morgan v. Ponder, 892 F.2d 1355, 1363 (8th Cir. 1989) ("[w]e need not determine the exact cause of [plaintiffs's firm's] demise. Nor must plaintiffs systematically eliminate all possible non-predatory causes.") (*dictum*). *Cf.* Hecht v. Pro-Football, Inc., 570 F.2d 982, 991 (D.C. Cir. 1977) (holding that *defendants* bear the burden of proof when they seek to avoid charges of monopolization by asserting that their monopoly power results from natural monopoly).

Rambus argues that in a standard-setting case, the plaintiff "must establish that the standard-setting organization adopted the standard in question, and *would not have done so but for* the misrepresentation or omission." RB at 121, citing II HOVENK-

Rambus argues that, even in light of full disclosure, JEDEC still would have standardized Rambus's technologies, because they were superior to all alternatives on a cost/performance basis. We find that the evidence does not establish that Rambus's technologies were superior to all alternatives on a cost/performance basis.[432] Although Complaint Counsel argue that at least six alternative technologies were available in each of the relevant product markets, we focus, with one exception,[433] on the technologies that Rambus's economic expert, Richard Rapp, analyzed. Because Rambus has failed to prove that

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AMP ET AL., IP AND ANTITRUST, § 35.5b at 35-40 (emphasis added by Rambus). The treatise, however, only states that such analysis should apply when the SSO has (1) "no policy with respect to intellectual property ownership in the standards they promulgate" or (2) "a history of promulgating standards even when they are aware that the proposer owns intellectual property rights in the standard." *Id.* at 35-40 to 35-41. Neither of those factors is relevant to the question of product superiority. Indeed, when the treatise does discuss what Rambus portrays as the fact pattern – when "a standard would have become dominant anyway in a *de facto* standards competition" and the patent "confers an economic monopoly because of the absence of feasible noninfringing alternatives" – the treatise is silent as to the burden of proof. *Id* at 35-41 to 35-42.

[432] Unless stated otherwise, all subsequent references in this section to the superiority of a given technology reflect an overall assessment based on a mix of cost and performance characteristics.

[433] Rapp did not analyze the cost information about toggle mode (a possible alternative to Rambus's dual-edge clocking) because he concluded that this technology's performance suffered above certain clock speeds. Rapp, Tr. 9856-57. We examine toggle mode because Rapp failed to explain why, as an economic expert, he made a judgment based on engineering attributes of this technology, but did not evaluate the performance implications of other technologies.

its patented technologies were superior to all of these technologies, we need not examine additional alternatives.[434]

Latency Technology. As discussed above,[435] latency technologies control the length of time between the memory's receipt of a data request and its release of responsive data.[436] The JEDEC DRAM standards incorporated programmable CAS latency technology, which Rambus now claims is covered by its patents. Alternatives available in the early 1990s included fixed CAS latency, blowing a fuse on a DRAM, and dedicated pins.

Rambus compares the variable cost of programmable CAS latency with the variable cost of each of these three alternative technologies. Based on this

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[434] Rapp excluded two categories of alternatives from consideration on dubious grounds. First, he did not consider any alternative that Donald Soderman, one of Rambus's engineering experts, identified as potentially subject to a Rambus patent. Rapp, Tr. 9831, 10215, 10217. The mere identification of possible patent infringement by Rambus's own expert witness – an engineer who lacked legal training – is an insufficient reason to exclude an alternative technology.

Second, Rapp excluded alternatives that Complaint Counsel's economic expert, McAfee, failed to find commercially viable. Rapp, Tr. 9810, 9841. In only one instance, however, did McAfee actually determine that an alternative was not commercially viable. In other instances, he merely concluded that he lacked sufficient information to reach a judgment one way or the other, or else stated that he was "agnostic" as to an alternative's commercial viability. *See* McAfee, Tr. 7362-63, 7372, 7385, 11354-56. Given that Rambus bears the burden of proving product superiority, McAfee's statements did not justify Rapp's decision to omit such alternatives from his comparison.

[435] *See supra* Section II.A.3.a.

[436] McAfee, Tr. 7348; Horowitz, Tr. 8529-30.

comparison, Rambus concludes that the alternatives were more costly even when Rambus's royalties were taken into consideration.[437] However, Rambus's cost estimates are unreliable for at least two reasons. First, Rambus assumes, without demonstrating, that alternatives to programmable CAS latency would have provided support for three latency values.[438] Considerable evidence indicates that JEDEC would have required only one or two latency values if it had standardized one of the alternatives.[439] Second, Rambus fails to take account of ways in which the alternative technologies may have reduced costs.[440]

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[437] *See* Rapp, Tr. 9813-18, 9831-33.

[438] *See* Geilhufe, Tr. 9578. Rambus's other engineering expert presented general testimony that different latencies provided optimal performance with different bus speeds and that users benefitted from the flexibility afforded by programmable CAS latency. Soderman, Tr. 9347, 9350-51.

[439] *See* McAfee, Tr. 11245-48. The record establishes that SDRAMs primarily used only two CAS latency values in main memory. *See* Rhoden, Tr. 394; Lee, Tr. 11004-05, 11063-67, 11097 (testifying that while Micron did produce a part that used a third CAS latency value, this was a small-volume part targeted to the graphics industry). JEDEC standards frequently have required only two latency values. IDF at 1140. In 1991, Samsung advocated a fixed CAS latency of two. JX 10 at 71; Rhoden, Tr. 425-27; Kellogg, Tr. 5099-5101. In 1995, discussion of SDRAM Lite within JEDEC focused on supporting one or two values. Lee, Tr. 6629-32, 11007-08.

[440] Complaint Counsel's engineering expert, Professor Bruce Jacob, testified that shifting to alternatives for programmable CAS latency would have enabled partial elimination of the mode register. *See* Jacob, Tr. 5376-77, 5384, 5388, 5593-95. One of Rambus's engineering experts acknowledged that this simplification could have reduced costs. *See* Soderman, Tr. 9419, 9515.

Fixed CAS Latency: A fixed CAS latency part sets a single latency value.[441] Rambus did not present any evidence that this technology had any performance issues. Nevertheless, Rambus argues that fixed CAS latency was not a viable alternative, estimating that it would have increased per-unit costs by three cents for reduced yields and two cents for inventory (while simultaneously reducing per-unit costs by one cent for improved testing).[442] Rambus potentially overstates the inventory costs because it assumes that three latencies would have been supported – a premise that, as discussed above, is not established by the evidence.[443] Rambus also fails to consider any factors that might have improved yield,[444] even though its expert's testimony indicated that yield problems tended to be solved "very quickly."[445]

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[441] Jacob, Tr. 5371.

[442] IDF at 1161-62.

[443] Using two latencies, instead of three, would have reduced inventory cost by one cent, which means that the total variable cost increase for this technology would have been three cents. Moreover, according to Complaint Counsel's engineering expert, some manufacturers used inventory systems that would have supported the use of fixed CAS latency without any cost increase. Jacob, Tr. 5592-93 (some manufacturers already assigned different part numbers to different latencies).

[444] *See* Geilhufe, Tr. 9577-78.

[445] While explaining how the cost of a DRAM could fall approximately 90% in 12 to15 months, Geilhufe stated that engineers "solve yield problems very quickly. You know, hundreds of engineers work on what is causing yield problems. So we get down the learning curve very, very quickly." *Id.* at 9586-87. *See also* Lee, Tr. 11013 (testimony by Micron's director of advanced technology and strategic marketing that fixed CAS latency parts were less complex than programmable CAS latency and therefore would have improved yields).

Blowing a Fuse on DRAM: Latency parts can include two CAS latency circuits, each of which can set a different latency value and has a fuse attached.[446] DRAM manufacturers can apply electric or laser technology to blow one of the fuses and prevent the use of the associated latency circuit.[447] Once blown, the DRAM manufacturer would have a fixed latency part with the desired latency value.[448] Rambus's engineering experts testified that electrically-blown fuses were less reliable than laser-blown fuses.[449] However, witnesses from Micron, IBM, and Infineon all testified that their companies used electric fuse-blowing technology.[450]

Rambus argues that programmable CAS latency was superior, in terms of both cost and performance, to setting CAS latency by blowing fuses.[451] As discussed above, Rambus has failed to establish the need to support three latency values or to demonstrate its predicted yield cost increase. Rambus also failed to rebut the testimony of Complaint Counsel's

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[446] Jacob, Tr. 5378-80.

[447] *Id.*

[448] Soderman, Tr. 9354; Geilhufe, Tr. 9585-86.

[449] Soderman, Tr. 9356-57; Geilhufe, Tr. 9581-82 (Intel discontinued using electric fuses on certain products for reliability reasons).

[450] *See* Lee, Tr. 11022, 11170 (*in camera*) (Micron had been using such fuses since 1989 and included a substantial number in its SDRAM products); Kellogg, Tr. 5130; Soderman, Tr. 9525-26 (*in camera*); *see also* Jacob, Tr. 5595-96.

[451] Geilhufe testified that this alternative to programmable CAS latency would have increased per-unit costs by three cents for reduced yield, two cents for inventory (covering three latency values), and one cent for certain testing. Geilhufe, Tr. 9584-86, 9589. *See also* Soderman, Tr. 9354.

engineering expert, Professor Bruce Jacob, that computer system OEMs themselves could blow the electric fuses, enabling the DRAM manufacturers to sell a single part,[452] thereby holding down inventory costs.

Dedicated Pins: Dedicated pins can determine latency during DRAM operation.[453] A single dedicated pin can store two CAS latency values, setting one CAS latency under a high voltage and the other latency under a low voltage.[454]

Rambus argues that programmable CAS latency enjoyed cost and performance advantages over dedicated pins. The record does not establish this argument. First, Rambus again fails to show that any alternative to programmable CAS latency would have had to support three latency values.[455] As discussed above, numerous witnesses disagreed with Rambus on this point. Rambus also fails to rebut testimony that, under most circumstances, the implementation

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[452] *See* Jacob, Tr. 5379-81.

[453] Jacob, Tr. 5386-87; Soderman, Tr. 9463.

[454] *See* Jacob, Tr. 5386-87; Polzin, Tr. 3991-92. Rambus's engineering expert agreed that two latencies can be supported with a single pin. Soderman, Tr. 9463.

[455] Geilhufe testified that the use of dedicated pins would have increased per-unit costs by four cents, reflecting the fact that four dedicated pins would have been required to replace the range of latency values available with programmable CAS latency. Geilhufe, Tr. 9590. An alternative that supported two latency values would have required the addition of at most two pins (given that pins must be added in pairs). *See generally* Polzin, Tr. 3991-92 (use of pins to set latency would "[c]ertainly" be "no more costly" than programmable CAS latency).

of dedicated pins might have been considerably more cost-effective than Geilhufe's predictions.[456]

In terms of performance, Rambus's engineering expert testified that implementing dedicated pins would have required additional wiring and "quite possibl[y]" could have created a "noise glitch."[457] However, IBM's engineer, Mark Kellogg, testified that such wiring would not have been necessary;[458] and the chief platform architect of Advanced Micro Devices (AMD), Steve Polzin, testified that pin-based solutions "probably could have been made to work just fine."[459] Rambus does not demonstrate that its contrary assertions deserve greater weight.

Burst Length Technology. As discussed above,[460] burst length technology controls the amount of data transferred between the CPU and memory in each transmission. The JEDEC DRAM standards adopted programmable burst length technology, which Rambus now claims is covered by its patents.

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[456] According to both Jacob and Lee, many JEDEC-compliant configurations included pins that served no existing function and could be used to set latency. Jacob, Tr. 5387, 11106 ("[n]early all" JEDEC pin-out diagrams had two extra pins available" and "most" had two or more); Lee, Tr. 11030, 11037 (extra pins "almost always" provided); CX 234 at 80-142. If JEDEC had used these extra pins to set latency, there would have been no cost increase for this alternative to programmable CAS latency. Geilhufe's counter-testimony was limited; he argued only that extra pins were unavailable "in the highest density cases." Geilhufe, Tr. 9722-23.

[457] Soderman, Tr. 9361-62.

[458] Kellogg, Tr. 5126-27.

[459] Polzin, Tr. 3991-92.

[460] *See supra* Section II.A.3.b.

Rambus's economic expert, Rapp, analyzed the costs associated with two alternatives to programmable burst length: fixed burst length and burst terminate commands. Rambus claims that programmable burst length was superior to any alternative because it allowed DRAM users to use one part for different types of machines that required different burst lengths, providing important flexibility.[461] However, Rambus assumes that JEDEC would have required more than two burst length values if it had adopted an alternative. The record does not establish that point.[462] Rambus has not shown that additional burst length flexibility was critical to DRAM technology.[463]

Fixed Burst Length: A fixed burst length part sets a single burst length.[464] Rambus argues that fixed

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[461] *See* Soderman, Tr. 9368-70; G. Kelley, Tr. 2550-51 ("The programmable [burst length] feature allowing you to make that selection when the PC or computer powered up was a nice feature because it allowed you to use devices that were common from multiple suppliers, put them into many different types of machines. . . . One part number fits many applications.").

[462] For example, Intel only used a burst length of four. Polzin, Tr. 3994. AMD, another microprocessor manufacturer, designed its microprocessors based on a single burst length of eight. *Id.*; *see also* Lee, Tr. 11048-54, 11095. JEDEC's preliminary specification for DDR2 SDRAM required only a burst length value of four, Macri, Tr. 4673-74, but subsequently was amended to include a burst length of eight to accommodate AMD. *See* Polzin, Tr. 3994; Lee, Tr. 11048-54, 11095.

[463] JEDEC required burst lengths of four and eight when it first published the SDRAM standard in 1993. *See* JX 56 at 114; Williams, Tr. 801-03; Lee, Tr. 11013-14. Ten years later, the proposed specification for DDR2 SDRAM required the same two burst length values. *See* RX 2099-14 at 21; RX 2099-39 at 20; Soderman, Tr. 9369; Rhoden, Tr. 411-12.

[464] Jacob, Tr. 5398-99.

burst length technology was not a cost-effective alternative to programmable burst length. According to Rambus, the use of fixed burst length would have increased inventory costs by three cents per unit, while decreasing certain test costs by one cent.[465] However, Geilhufe's inventory cost estimate assumed that four burst length values would have been provided.[466] If, instead, he had assumed that only two burst lengths would have been supported, his entire projected cost increase would have disappeared. Geilhufe also failed to consider cost savings that would have resulted from partial elimination of the mode register.[467]

Burst Terminate Commands: Burst terminate command technology uses long, fixed burst lengths that can be terminated by the memory controller if a shorter burst length is desired.[468] Rambus argues that this technology was not a viable alternative because it could support only a narrow range of burst lengths and therefore would have limited DRAM performance.[469] We are unconvinced. As noted above, Rambus has failed to establish that JEDEC likely

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[465] Geilhufe, Tr. 9593-96.

[466] *See* Geilhufe, Tr. 9595.

[467] *See* Jacob, Tr. 5401-10, 5593-95 (either fixed burst length or a burst terminate command would have enabled elimination of part of the mode register and the circuitry required to initialize it).

[468] Jacob, Tr. 5409-10.

[469] Soderman, Tr. 9377 (implementation of burst terminate in DDR2 SDRAM was limited because it could support only burst length values of four and eight); Geilhufe, Tr. 9598 (questioning whether a burst terminate command could support a burst length value of one).

would have required more than the two burst lengths supportable with burst terminate commands.

Rambus also argues that the burst terminate command technology causes system inefficiencies.[470] However, several witnesses questioned the significance of these inefficiencies.[471] Furthermore, those witnesses explained that the problems would have been minimized, or avoided, by supporting just two burst length values – such as four and eight.[472] On this record, Rambus has failed to demonstrate serious performance issues with burst terminate command technology.[473]

Data Acceleration Technology. As discussed above,[474] data acceleration technology determines the speed at which data are transmitted between the CPU and memory. JEDEC's DDR SDRAM and

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[470] *See* Soderman, Tr. 9374-76 (a burst terminate command causes inefficiencies when a read burst interrupts a write burst or vice versa); Polzin, Tr. 4038-40; CX 392 at 5; CX 415 at 10 ("an internal device timing nightmare").

[471] *See* Jacob, Tr. 5411 (problem not very significant), 5604-06 (might affect bus efficiency by up to 10-15% in a "hypothetical worst case situation[]"), 11109-10 (type of inefficiency at issue is common and inherent in the DDR protocol).

[472] *See* Jacob, Tr. 11142-46; Macri, Tr. 4774-76 (*in camera*) (limiting interruptions to a precise place and under precise conditions makes burst terminate commands "much easier"; "there's a slight burden to the designer, but, you know, in the big scheme of things, this is a trivial thing . . . ."); RX 2099-39 at 20, 63. Even Rambus's engineering expert acknowledged that limiting burst terminate commands to specific conditions avoids timing problems. Soderman, Tr. 9377.

[473] Rambus acknowledges that use of burst terminate commands would not have increased costs. *See* Rapp, Tr. 9826.

[474] *See supra* Section II.A.3.c.

DDR2 SDRAM standards adopted dual-edge clocking technology – a technology Rambus now claims is covered by its patents.

Interleaving ranks on the module, double clock frequency, and toggle mode were some of the alternatives to dual-edge clocking considered by JEDEC. Rambus argues that all three of these alternatives had significant cost and performance limitations. We agree that interleaving ranks on the module had such limitations. However, Rambus has not adequately supported is conclusions regarding double clock frequency and toggle mode.

Interleaving Ranks on the Module: DRAM chips on the memory module can be partitioned into two separate groups that operate on independent system clock signals.[475] This approach – known as interleaving ranks on the module – can double the rate at which data are transmitted between the CPU and memory.[476]

Rambus argues that dual-edge clocking enjoyed performance and cost advantages over this alternative. Rambus cites evidence that both Intel and AMD found signal integrity problems during preliminary evaluations of the interleaving-ranks technology.[477] Complaint Counsel do not rebut this evidence. Rambus's engineering expert testified that this alternative offered less flexible memory increments and was not appropriate for every application.[478] Complaint Counsel offer only a partial rebuttal. The record also

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[475] Jacob, Tr. 5426-27.

[476] *Id.*

[477] *See* RX 1976 at 49 (*in camera*); Polzin, Tr. 4035-36.

[478] Soderman, Tr. 9389-91.

shows that interleaving ranks would have resulted in increased costs because it would have required additional technology and hardware.[479] Complaint Counsel again fail to rebut the evidence. Finally, Kentron in 1999 informed JEDEC that it had a patent pending on this technology.[480] Complaint Counsel's economic expert, McAfee, acknowledged that this technology might require royalty payments.[481]

Based on the totality of the evidence, we find that Rambus has established the superiority of dual-edge clocking over this particular technology.[482]

Double Clock Frequency: Double clock frequency involves operating a single-edge clock at twice the frequency of a dual-edge clock.[483] Rambus has failed to demonstrate that this technology was an unacceptable alternative to dual-edge clocking.

Rambus argues that double clock frequency raises clock distribution problems,[484] requires that the in-

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[479] Soderman, Tr. 9389-91; Goodman, Tr. 6082. Geilhufe testified that the necessary hardware would have increased costs by 25 cents per DRAM. Geilhufe, Tr. 9605-06; *see also* Goodman, Tr. 6046-47, 6083 (each module would have required eight switches at $1 per switch).

[480] *See* CX 150 at 110.

[481] *See* McAfee, Tr. 7404-05.

[482] Because we conclude that Rambus has not established the superiority of dual-edge clocking over double clock frequency and toggle mode, however, a showing of superiority over interleaving ranks matters little. Absent a sufficient showing regarding the remaining alternatives, Rambus has not demonstrated that its monopoly power resulted from the superiority of its technology, rather than from its failure to disclose its patent position.

[483] Jacob, Tr. 5433-34.

[484] Soderman, Tr. 9393-94.

ternal circuitry operate at twice the speed of a dual-edge clock,[485] and presents electromagnetic interference concerns.[486] However, these performance concerns were rebutted by Micron's Lee, IBM's Kellogg, and Complaint Counsel's expert witness, Jacob.[487] Other testimony portrayed double clock frequency as a technologically satisfactory alternative to dual-edge clocking.[488] TI clearly found double clock frequency desirable: in 1997 it proposed that JEDEC adopt double clock frequency for its standards.[489]

Rambus's expert testified that double clock frequency would increase per-unit costs by 28 cents,[490] including 24 cents for a clock on the dual in-line memory module (DIMM), which he believed would be necessary.[491] However, the record does not support Rambus's assertion that an on-DIMM clock would be needed.[492] Moreover, considerable evidence suggests

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[485] Soderman, Tr. 9394-95.

[486] Soderman, Tr. 9395; 9500-01 (asserting that this interference might breach Federal Communications Commission guidelines).

[487] *See* Jacob, Tr. 5433-34, 11115, 11128-29 (slightly reducing voltage mitigates the interference problem); Lee, Tr. 11039-40; Kellogg, Tr. 5182-83 (engineers reduce electromagnetic interference over time).

[488] *See* Kellogg, Tr. 5182, 5184-85; Macri, Tr. 4779-80 (*in camera*) (identifying a "huge" benefit from single-edge clocking).

[489] *See* Lee, Tr. 6711-14; CX 371 at 3.

[490] Geilhufe, Tr. 9610.

[491] Geilhufe, Tr. 9609-10 (speaking in terms of "on-DIMM clock circuitry, possibly on-DIMM PLL/DLL"), 9715 (speaking in terms of an "[o]n-DIMM PLL or DLL circuit, maybe more than a PLL/DLL").

[492] Geilhufe neither spoke to anyone to confirm the assumption, nor conducted his own timing analysis. Geilhufe, Tr. 9715,

that Rambus's estimates for the cost of an on-DIMM clock are unreliable.[493] Finally, Rambus fails to consider design, construction, and testing cost savings that would have resulted from substituting a single-edge clock for Rambus's dual-edge clock.[494]

9729. In contrast, a July 28, 1997 TI proposal for using a high-frequency clock made no mention of an on-DIMM PLL/DLL. *See* CX 371. According to Micron's Lee, this proposal would have required "some changes to the bus topology," but not the addition of clock circuitry or a DLL to the module, and "would not have any additional cost over what we were doing." Lee, Tr. 6713-14, 11040. Indeed, Rambus's other engineering expert, Soderman, did *not* claim that on-DIMM clock circuitry would be needed. *See* Soderman, Tr. 9393-95.

[493] Geilhufe testified that an on-DIMM clock costs $3.80 per module (which, allocated over 16 DRAMs, increases cost 24 cents per unit). Geilhufe, Tr. 9606, 9609-10. Geilhufe acknowledged that 16 DRAMs was "the smallest number of units" over which the cost of on-DIMM clock circuit could be allocated. Geilhufe, Tr. 9605-06. For computers with more than 16 DRAMS, this calculation would overstate the clock-circuitry cost per DRAM.

On cross-examination, Geilhufe was shown a document stating that a Kentron PLL circuit cost $2, rather than the $3.80 that he had assumed. Geilhufe acknowledged that he had unsuccessfully sought cost information about the Kentron PLL. *See* CX 2613 at 7; Geilhufe, Tr. 9718-19. Kentron's CEO, Robert Goodman, stated that a standard PLL costs around $1, Goodman, Tr. 6049. Lee testified that Micron pays only 90 cents for PLLs used on register memory modules. Lee, Tr. 11179 (*in camera*); *see also id.* at 11180-81 (*in camera*) (mounting would add further cost but would be "much less" than the cost of the PLL itself). Geilhufe testified that he "did not review specifically the costs for register [memory modules]," but he did not explain why he had not done so. Geilhufe, Tr. 9719. Rambus seeks to dismiss the PLL cost data by suggesting that the Micron PLLs might not operate at the appropriate frequency, but fails to demonstrate that this was so.

[494] *See* Jacob, Tr. 5420-25, 5433-34.

Toggle Mode: Toggle mode was designed by IBM and uses synchronous technology for outputs but asynchronous technology for inputs.[495] JEDEC considered toggle mode in 1990 and 1991.[496] Rambus's contention that IBM's asynchronous design could not achieve the same performance as synchronous technology[497] was contradicted by other evidence.[498] Rambus's engineering expert also testified that the toggle mode alternative would increase per-unit costs by ten cents due to reduced yields and by two cents for design costs and an additional pin.[499] As mentioned above, Rambus's same expert testified that engineers "solve yield problems very quickly,"[500] which casts doubt on this predicted yield cost increase.

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[495] *See* G. Kelley, Tr. 2514; Jacob, Tr. 5608; CX 34 at 32. With asynchronous technology, the internal clock on each DRAM is not coordinated with the computer system clock. *See* IDF 284; Rhoden, Tr. 368. In contrast, operations in DRAMs that use synchronous technology are coordinated with the system clock, which facilitates rapid communication between the CPU and memory. *See supra* note .

[496] *See* CX 251 at 1; CX 314 at 1; CX 315 at 1-3; CX 318 at 1.

[497] *See* Soderman, Tr. 9398-99.

[498] *See* Jacob, Tr. 5417. Rambus introduced evidence that an IBM researcher had described toggle mode as "very big, very hot, and very nonstandard," which are "disastrous" attributes "in the commodity market." *See* RX 2099-7 at 16; Soderman, Tr. 9399-9400. Rambus omits that the researcher also found toggle mode "very fast" and, for some purposes, desirable. *See* RX 2099-7 at 16. All of the researcher's conclusions were confined to the "cumulative effect" of combining toggle mode with a specific "low multibit piecepart architecture" and did not extend to toggle mode more generally. *See id.*

[499] Geilhufe, Tr. 9562-64, 9610-12.

[500] Geilhufe, Tr. 9587.

Clock Synchronization Technology. As discussed above,[501] clock synchronization technology coordinates the timing of a computer system clock with the internal clock in each DRAM. JEDEC's DDR SDRAM and DDR2 SDRAM standards adopted technology that uses on-chip PLL/DLL circuits to align more closely the timing of the two clocks. Rambus now claims that its patents cover on-chip PLL/DLL as implemented in JEDEC-compliant products.

Rapp analyzed four alternatives to on-chip PLL/DLL technology: placing DLL circuits on the memory controller; placing DLL circuits on the memory module; using vernier circuits instead of on-chip PLL/DLL circuits; and relying on the DQS strobe rather than the system clock to align timing.[502] Rambus presents scant evidence on the cost or performance limitations of placing DLL circuits on the memory controller or the module, and therefore fails to meet its burden of demonstrating the superiority of its on-chip PLL/DLL technology. Rambus presents slightly more evidence regarding the performance limitations of vernier circuits, but not enough to sustain its burden of proof. The record as to possible performance limitations of the DQS strobe is mixed.

DLL on the Memory Controller: One alternative to on-chip PLL/DLL involves placing a single DLL circuit on the memory controller to synchronize the DRAM's internal clock with the system clock.[503] Rambus presented no cost evidence relating to this alternative, but it did present expert engineering tes-

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[501] *See supra* Section II.A.3.d.

[502] *See* Rapp, Tr. 9841-42.

[503] *See* Jacob, Tr. 5445.

timony as to potential performance limitations.[504] Complaint Counsel's expert provided equally plausible rebuttal testimony as to performance, and also identified cost advantages from placing the DLL on the memory controller.[505] Other evidence reflected contemporaneous beliefs that this alternative was workable and desirable. For example, in March 1996, Samsung presented a proposal to JEDEC that involved removing the PLL circuit from the DRAM chip and placing it on the memory controller.[506] In light of the evidence as a whole, Rambus has not carried its burden with respect to this alternative.

DLL on the Module: Another alternative to on-chip PLL/DLLs involves placing one or more DLL circuits on the memory module to synchronize the internal clock on each DRAM with the system clock. Rambus argues that DLLs on the module fail to address timing differences among individual DRAMs,[507] but Jacob countered that DLLs would account for internal delay.[508]

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[504] Soderman testified that DLL circuits on the memory controller fail to address timing differences among individual DRAMs and therefore impair high-speed performance. *See* Soderman, Tr. 9405-06.

[505] *See* Jacob, Tr. 5446-47 (placing the DLL on the memory controller could potentially eliminate outbound, inbound, and return delays, and thereby enable operation at higher rates of speed than on-chip DLLs; placing the DLL on the memory controller also would lower testing and manufacturing costs and reduce the power consumption of DDR SDRAMs).

[506] *See* JX 31 at 71; Rhoden, Tr. 513-514; Lee, Tr. 6691.

[507] Soderman, Tr. 9406-10.

[508] Jacob, Tr. 5449.

Rambus estimates that an on-DIMM DLL would cost $3.80.[509] We find that Rambus has failed to adequately support this estimate for the same reasons described above with respect to its estimate of the cost of double clock frequency.[510] Rambus's own economic expert assigned no cost to this alternative to on-chip PLL/DLL because he found a "paucity . . . of information."[511] Although Rambus's expert was certain there would be some additional costs, he determined that "it seemed sensible . . . to simply assume there would be no cost penalty" for purposes of his calculations.[512]

Vernier Circuits: Verniers are a type of circuit that – similarly to PLLs and DLLs – can be placed on a DRAM.[513] Vernier circuits introduce a fixed-amount delay into the DRAM's internal clock to synchronize that clock with the system clock.[514] Rambus claims that vernier circuits do not perform well enough to be viable alternatives to on-chip PLL/DLL.[515] However, several witnesses testified as to the advantages of vernier circuits.[516]

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[509] *See* Geilhufe, Tr. 9613. Both Jacob and Geilhufe testified that on-module DLLs would reduce other costs. *See* Jacob, Tr. 5450 (on-module DLLs reduce DRAM power consumption, costs, and design time); Geilhufe, Tr. 9612-13.

[510] *See supra* note 493.

[511] *See* Rapp, Tr. 9848.

[512] *Id.* at 9878, 10228 (it "seemed fairer in some sense to assume zero").

[513] *See* Jacob, Tr. 5450-51.

[514] *Id.*

[515] *See* RFF 1103-11.

[516] Complaint Counsel's expert stated that verniers potentially could eliminate outbound, internal, and return delays, Jacob,

Rambus notes that the SyncLink consortium considered designing the SLDRAM chip using verniers, without PLLs or DLLs on the DRAM, but ultimately included both verniers *and* DLLs on the DRAM.[517] Rambus argues that this example demonstrates that verniers were not viable alternatives to on-chip DLL/PLL, but the record offers competing explanations for why Synclink included DLLs in SLDRAM.[518]

Rambus further asserts that Micron and SLDRAM hold patents that cover the use of verniers,[519] but provides no element-by-element analysis – indeed, no evidence beyond the bare text of the patents – to support this contention.[520] Rambus makes no argument about the implications of these patents for the viability of vernier circuits as an alternative to on-chip DLL/PLL.

Tr. 5451, and that periodic recalibrations could compensate for fluctuations in temperature and voltage. *Id.* at 5450-53. IBM viewed verniers as the optimal solution for data capture purposes; IBM implemented verniers on a memory card and promoted the use of verniers at JEDEC meetings. *See* Kellogg, Tr. 5168, 5157, 5153-54. Micron's advanced technology director testified that he had considered verniers to be an acceptable alternative to on-chip DLLs in the 1996-97 time frame. Lee, Tr. 6676-78. A March 1997 VLSI presentation to JEDEC included the use of verniers. JX 36 at 7, 58, 64.

[517] *See* RX 2099-43 at 158; Soderman, Tr. 9412-14.

[518] *Compare* Soderman, Tr. 9414-15 (DLLs were included "to provide a stable reference for input sampling d[el]ay lines" (describing RX 2099-11 at 5)) *with* Jacob, Tr. 5620-21 *and* Lee, Tr. 11044-46 (DLLs were included to provide tight timing on the bus, not to assist in data capture), 11092.

[519] *See* RFF 1105, 1111.

[520] *See* RFF 1111 (citing RX 1701; RX 1479).

DQS Strobe: A DQS strobe, also referred to as a data strobe, signals to the memory controller the timing of data capture.[521] In doing so, the DQS strobe purportedly makes it unnecessary to align the internal clock with the system clock.[522] Rambus presented no cost evidence relating to this alternative technology, but claims that DQS strobes are insufficient for high speed performance.[523] The record contains conflicting evidence, however, suggesting that most JEDEC members believed this technology offered adequate performance.[524] Indeed, DQS strobes are part of the DDR SDRAM standard and were included in proposed specifications for DDR2 SDRAM.[525]

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We conclude that Rambus has failed to meet its burden of demonstrating that JEDEC would have standardized Rambus's technologies even if Rambus had disclosed its patent position. With regard to per-

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[521] Jacob, Tr. 5456-57; Kellogg, Tr. 5158-59.

[522] *See* Jacob, Tr. 5456-57; Lee, Tr. 6681-83.

[523] *See, e.g.*, Soderman, Tr. 9415-17; RX 1040 (e-mail prepared by HP JEDEC representative Hans Wiggers explaining his preference for using DLLs at high speeds, in response to a message entitled, "Death to DLLs"); RX 1086 at 1 (*in camera*).

[524] *See* Lee, Tr. 6682-83; Kellogg, Tr. 5158-59; CX 368 (Micron proposal that JEDEC standardize DQS strobes in DDR SDRAM without DLLs); CX 370 (Silicon Graphics proposal that JEDEC standardize data strobes without DLLs); RX 911 at 3 (SyncLink's design included a data strobe); CX 711 at 72 (noting Hyundai's belief that strobes eliminate need for PLLs/DLLs); *cf.* Jacob, Tr. 5456-57 (presenting DQS strobe alternative).

[525] JX 57 at 5; RX 2099-14 at 3; RX 2099-39 at 5. On-chip DLLs can be disabled in DDR SDRAM but are needed for normal DDR operation. *See* Lee, Tr. 6680-81, 6683; CX 234 at 176; JX 57 at 5, 16.

formance attributes, the testimony of Rambus's experts was offset by conflicting testimony from Complaint Counsel's experts, which called into question the significance of Rambus's performance concerns. In many instances, testimony from JEDEC members and evidence of their prior actions in sponsoring the alternative technologies substantially buttressed Complaint Counsel's case.

With regard to costs, Rambus failed to demonstrate that alternatives would have been more expensive. Rambus's economics expert, Rapp, compared the added variable costs associated with the alternatives, based on Geilhufe's cost estimates, to the costs of paying royalties for Rambus's patented technologies. Rapp testified that the least costly alternatives would add .82 percent to the selling price of SDRAM and 5.65 percent to the selling price of DDR SDRAM.[526] He concluded that these costs exceeded Rambus royalties of .75 percent of selling price for SDRAM and 3.5 percent for DDR SDRAM.

Rapp's calculations are fraught with uncertainty and potential for error. They are based on Geilhufe's admittedly imprecise cost estimates. Geilhufe acknowledged that his cost estimates were approximations and he assigned them a sizeable 25 percent margin of error.[527] Yet a 25 percent reduction of

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[526] Rapp, Tr. 9831-32, 9850-54. To compare the dollar figures calculated for cost increases with the percentage figures used in stating Rambus's royalties, Rapp projected an average selling price over the expected lifetimes of the products, calculating an average selling price of $4.87 for SDRAM and $5.13 for DDR SDRAM. *Id.* at 9816-17, 9845. Rapp then translated the increased variable costs of the alternatives into a percentage of average selling price. *Id.* at 9816-17, 9845.

[527] *See* Geilhufe, Tr. 9665.

Rapp's estimate of the least-costly alternative to SDRAM would bring that estimate well below the level of SDRAM royalties.[528] Moreover, Geilhufe drew many of his estimates from personal experience, without verification by actual cost data or substantiation by supporting record evidence.[529] As to DDR SDRAM, Rapp had to premise his comparisons on projections of future DRAM selling prices and sales volumes.[530]

Rapp's cost estimates drop considerably when revised to reflect different assumptions. For example, recalculating Rapp's estimate of a least-cost alternative to Rambus technologies in SDRAM based on support of two, rather than three, latencies[531] yields total increased cost of .62 percent of selling price, which is less than the .75 percent SDRAM royalty paid to Rambus.[532] Similarly, applying Rapp's methodology to alternatives to Rambus technologies in DDR SDRAM yields costs well below Rambus royalty

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[528] A 25% margin of error for SDRAM equates approximately to .21% of selling price.

[529] *See* Geilhufe, Tr. 9665-67. Geilhufe acknowledged that he did not seek actual cost data from DRAM manufacturers to verify his cost estimates. *Id.* at 9666-67.

[530] Rapp had to estimate future DRAM prices over the expected life of DDR SDRAM, then weight those prices by estimating sales volumes for each of the future years. *Id.* at 9816-17. Rapp acknowledged that for DDR SDRAM, with limited historical data, the numbers were "mostly estimate." *Id.* at 9845.

[531] *See supra* note 439 and accompanying text.

[532] *See supra* notes 443 and 473 (showing a total cost increase of only $.03 per unit for a combination of fixed CAS latency and burst terminate commands).

levels.[533] Moreover, Rapp's calculations, like Geilhufe's estimates, wholly ignore several possibilities for cost reductions from adoption of the alternative technologies.[534]

In sum, Rambus has not shown that all alternatives would have been more costly than its royalties and has not carried the burden of establishing its inevitability/superiority defense.[535]

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[533] If, as the record suggests, no clock-circuitry was needed for double clock frequency, *see supra* note 492, total increased cost for a combination of fixed CAS latency, burst terminate commands, double clock frequency, and a clock synchronization technology would have been seven cents, or 1.36% of DDR SDRAM selling price, which is far below Rambus's 3.5% royalty. (Like Rapp, we assign no added cost for alternative clock synchronization technology.) If clock-circuitry was necessary, the record shows that PLLs sold for between 90 cents and $2. *See supra* note 493. Even based on the *highest* price, the increased cost for the combination of alternatives to Rambus's four patented technologies would have exceeded Rambus's royalty by less than Geilhufe's admitted margin of error.

[534] *See supra* notes 440, 445, 452, 456, 467, and 494 and accompanying text.

[535] Rambus also argues that the decision of three JEDEC members, with knowledge of Rambus's patents, to develop and manufacture a DRAM chip known as RLDRAM, using programmable CAS latency and burst length and dual-edge clocking, was evidence of the superiority of Rambus's technologies. RB at 59-60. RLDRAM, however, was a high-price, niche product used for specialty applications such as high-speed routers. *See* Bechtelsheim, Tr. 5867, 5870-71 (RLDRAM is priced "several times higher than commodity DRAM"); McAfee, Tr. 7428-31 (showing that RLDRAM sales were very small); Prince, Tr. 9021-22 (omitting mention of RLDRAM when asked to name "any DRAM" that had not been standardized by JEDEC or IEEE). Given RLDRAM's niche nature, a willingness to absorb Rambus royalties for RLDRAM tells little about JEDEC mem-

c. Rambus's Claim that the Link between its Conduct and the Standards Did Not Matter

Rambus backstops its inevitability/superiority claim by asserting that even if its conduct distorted the decisionmaking process at JEDEC, that did not have the effect of harming competition because the interests of JEDEC and it members were not necessarily aligned with the interests of the public as a whole.[536] We reject that argument. As discussed above, JEDEC comprises a broad range of industry participants – including, most importantly, the principal purchasers of both DRAM technologies and DRAMs. The technology choices made by the JEDEC members during the standard-setting process reflect the opinions of virtually the entire spectrum of economic actors who are directly impacted by JEDEC's standard-setting decisions. Courts and commentators long have recognized that a fair, honest, and consensus-based standard-setting process can be beneficial to consumers, while substantial competitive concerns may arise when the standard-setting choices of the SSO's participants are distorted.[537] Rambus offers no logical explanation, and cites no supporting precedent, for why the interests of JEDEC and its members would be inconsistent with a procompetitive result, or why we should overlook conduct that distorted the decisions of JEDEC.

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bers's preferences for high-volume, low-cost, main memory purposes.

[536] RB at 126-28.

[537] *See, e.g.*, Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 500-01, 510 (1988); II HOVENKAMP ET AL., IP AND ANTITRUST, §§ 35.4(a)(4), 35.5.

Rambus also argues that because standard setting is a "winner-take-all" process, a "but for world" in which Rambus had disclosed its patent position would have been no better than the real world in which JEDEC adopted standards incorporating Rambus's patented technologies.[538] We reject this claim, too. Payment of royalties on memory interfaces has been very much the exception, rather than the rule, in the computer industry.[539] JEDEC could have turned to unpatented alternative technologies in each of the relevant product markets.[540] But even assuming, *arguendo*, that JEDEC still would have been willing to adopt Rambus's patented technologies after disclosures had been made, JEDEC and EIA policies would have prohibited the standardization of those technologies unless Rambus committed to licensing on RAND terms.[541] If Rambus had refused to provide the requisite RAND assurances, JEDEC

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[538] RB at 126.

[539] *See, e.g.*, Heye, Tr. 3918 (AMD has not paid royalties on memory interfaces to anyone other than Rambus).

[540] *See supra* Section IV.C.3.b. For example, the record contains no suggestion that using fixed CAS latency or fixed burst length, setting CAS latency with fuses or pins, or setting burst length with fuses or burst terminate commands, would have raised patent issues. Nor does the record suggest that using double clock frequency or toggle mode, or relying on data strobes, or putting DLLs on the module or memory controller, would have involved proprietary technology.

[541] *See supra* note 285 and accompanying text (citing JEDEC and EIA rules that prohibited the standardization of patented technologies without first securing "all relevant technical information" and assurances that the patent holder will license on RAND terms).

would have been bound by its rules to avoid Rambus's patented technologies.[542]

Alternatively, Rambus might have acceded to JEDEC's licensing policies, and JEDEC members then would have had the benefit of RAND terms. Moreover, JEDEC members at least would have had the opportunity to seek specific royalty commitments from Rambus through *ex ante* negotiations; it was not up to Rambus to preclude that possibility.[543] No mat-

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[542] Rambus highlights the decision of a different EIA unit, the Consumer Electronics Association (CEA), to refrain from requiring a RAND assurance from Echelon Corporation. CEA chose not to invoke its licensing rule – potentially permitting Echelon to block a standard by non-compliance – but only after Echelon had announced its intention to block the standard; had engaged in a pattern of efforts over time to halt the standard development effort; and had "been unable to explain or document how the [CEA] standard refer[red] to or require[d] use of any of Echelon's patented technology." RX 2299 at 2; *see* J. Kelly, Tr. 2155-70 (EIA never received a response from Echelon as to how its patent related to the standard under development; CEA "could see no relevance whatsoever between the patent" and its standard-setting work); RX 2300.

Additionally, Rambus claims that JEDEC itself has adopted standards without seeking RAND assurances. Rambus cites only brief notations in JEDEC minutes, indicating that JEDEC approved ballots on which patent issues had been raised. The minutes – generally just one- or two-word notations – do not explain how the patent issues were resolved. They do not establish that the suspected patents actually existed, much less that they applied to the standards. Nor do the minutes indicate whether the patentee ever intended to enforce the patents against JEDEC-compliant products. The minutes do not even state that RAND assurances were not, in fact, offered. *See* JX 15 at 5-6, 8-9,14; JX 25 at 10. Rambus elicited no testimony to clarify these issues.

[543] Rambus nonetheless asserts that any incentive for the DRAM manufacturers to negotiate royalties *ex ante* would have

been "very weak" because, under JEDEC's requirement of "non-discriminatory" terms, all DRAM manufacturers would have been affected uniformly. RB at 71-72. Rambus's sole record support is testimony from its economic expert, David Teece. *Id.* Teece, however, did not deny that DRAM manufacturers possessed incentives to negotiate *ex ante*. Rather, he characterized what he viewed as the practical difficulties of such negotiations as counter-incentives. *See* Teece, Tr. 10349, 10352-54 (stating that "firms have got incentives to do lots of things that they don't do"), 10360 ("because of these costs and difficulties, you're incented not to incur those costs and difficulties [associated with *ex ante* negotiation]"); Elsewhere, Teece has given credence to the incentive to seek *ex ante* negotiations. *See* David Teece & Edward Sherry, *The Interface Between Intellectual Property Law and Antitrust Law: Standards Setting and Antitrust*, 87 MINN. L. REV. 1913, 1993-94 (2003) ("one would expect that, at least when the royalty rates are negotiated ex ante (prior to the adoption of the standard), the patent holder would moderate its royalty demands").

Rambus further contends that an opportunity to negotiate would have been meaningless because it is "all but impossible" to negotiate licenses for patent applications, which are shrouded in uncertainty. RB at 72. If so, then the record demonstrates that Rambus itself achieved the unattainable. Rambus had entered into RDRAM license agreements with three firms by 1992 – despite having only patent applications at that time. *See* RX 538 at 9, 13, 42 (1991 Rambus license to NEC); CX 543a at 11 (1992 Rambus business plan referencing RDRAM licenses with Toshiba, Fujitsu, and NEC); Parties' First Set of Stipulations, Item 11 (Rambus's first issued patent was the '703 patent); CX 1460 at 1 (the '703 patent issued in 1993). Rambus also granted numerous RDRAM, SDRAM, and DDR SDRAM licenses that included patent applications. *See* CX 1600 at 3-4, 6-7 (Hyundai license covering all DRAMs using all or part of Rambus's interface technology); CX 1609 at 3, 6 (Mitsubishi RDRAM license); CX 1617 at 4, 7 (Siemens RDRAM license); CX 1646 at 3, 6 (Micron RDRAM license); CX 1680 at 12, 19, 24 (*in camera*) (Toshiba SDRAM/DDR SDRAM license); CX 1681 at 2-3, 10 (*in camera*) (Hitachi SDRAM/DDR SDRAM license); CX 1683 at 2, 7, 10 (*in camera*) (OKI SDRAM/DDR SDRAM license); CX 1685 at 2, 8, 12 (*in camera*) (NEC SDRAM/DDR SDRAM license); CX

ter what the specific outcome might have been, the consequences of incorporating Rambus's patented technologies into the standards would have been identified and weighed *before* the standards were adopted, *when Rambus's technologies were competing with the alternatives.* That "but for world" would have been more competitive than the current DRAM marketplace, in which Rambus has monopoly power and can charge whatever royalties it chooses.

d. Rambus's "No Lock-In" Claim

Rambus claims that, even if it did acquire any monopoly power by virtue of the incorporation of the four key patented Rambus technologies into the JEDEC standards, this monopoly power was not enduring because industry participants who practiced the standards were not "locked in." In effect, Rambus claims that there were no barriers to entry to rivals wishing to challenge its monopoly position.[544] The ALJ agreed with this argument, concluding that Complaint Counsel had failed to establish that the

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1686 at 2, 7, 11 (*in camera*) (Elpida SDRAM/DDR SDRAM license); CX 1687 at 2, 8, 11-12 (*in camera*) (Samsung SDRAM/DDR SDRAM license); CX 1689 at 2, 7-8, 13-14 (*in camera*) (Mitsubishi SDRAM/DDR SDRAM license).

[544] In contrast, internal Rambus documents described the DRAM industry as susceptible to lock-in. *See, e.g.*, CX 533 at 15 ("Once a DRAM or vend[or] [has] committed to an architecture [it is] unlikely to change"). Rambus's principal engineer, Ware, similarly observed that once a DRAM controller manufacturer begins using a technology – even if not essential to the part – "it becomes more difficult [for that company] to not use it once you have put it in your design"). CX 2115 at 135 (deposition transcript at 134) (Ware FTC Dep.) (*in camera*). *See also* CX 5011 (designated R401155) (1998 Rambus Strategy Update stating, "We should not assert patents against Direct partners until ramp reaches a point of no return (TBD)").

DRAM industry had become locked into the JEDEC standards.[545]

Our analysis necessarily is anchored by timing. Lock-in must be assessed as of the time that JEDEC members gained sufficient information to know that Rambus had relevant patents and could have taken responsive action. JEDEC members lacked knowledge of Rambus's patent position until Rambus filed its first infringement suit against a producer of JEDEC-compliant DRAMs in early 2000. After that, it took some time for the information to be disseminated and evaluated. Each JEDEC member individually needed to explore alternatives – such as licensing and possible design changes – and to determine how it preferred to proceed. At that point, the JEDEC members could begin in earnest to try to agree on a revised standard.[546]

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[545] ID at 326-29.

[546] *See, e.g.*, CX 1855 (January 2000 Rambus complaint alleging that Hitachi's SDRAM and DDR SDRAM products infringed four Rambus patents but not identifying the specific claims or technologies at issue). Rambus revealed the nature of its claims to additional JEDEC members during the second quarter of 2000. CX 1109 at 1; CX 1127; CX 1129; CX 1371; CX 2559 at 3; Crisp, Tr. 3435-36. Some JEDEC members quickly recognized the implications of Rambus's patent enforcement efforts. *See, e.g.*, Rhoden, Tr. 532-33; CX 2459 at 1 (indicating that initial work-around proposals regarding programmable CAS latency were presented in March 2000). Other JEDEC members needed additional time before they gained a detailed understanding of Rambus's claims. *See* Krashinsky, Tr. 2782 (stating that he learned that Rambus claimed a patent on programmable CAS latency "midyear or so" in 2000); Polzin, Tr. 3987 (stating that he learned that Rambus claimed patents on technologies used by AMD in "late summer 2000" and that he conducted an analysis of the Rambus patents at that time). Discussions of possible ways to avoid Rambus's patents on dual-edge clocking for pur-

If the DRAM industry had become locked into Rambus's technology by the time that industry participants were apprised of, and able to take action in response to, Rambus's enforcement efforts, Rambus would have achieved durable monopoly power. If, however, the industry still had the practical ability to avoid Rambus's patents by switching to alternative technologies, Rambus would not have obtained durable monopoly power.[547]

We find that the DRAM industry was locked into the SDRAM and DDR SDRAM standards by 2000, by which time the JEDEC members were, in theory, in a position to take actions to avoid Rambus's patents. The record does not, however, establish a sufficient causal link between Rambus's exclusionary conduct and JEDEC's adoption of DDR2 SDRAM.

SDRAM. The SDRAM standard was first published by JEDEC in 1993. Rambus claims patent protection over technology from the latency and burst length product markets that was incorporated into the standard.

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poses of DDR2 SDRAM began in a JEDEC task group in late October 2000 and reached the JC 42.3 Committee in December 2000. Krashinsky, Tr. 2827-28; Lee, Tr. 6800-02; CX 426; JX 52 at 45-50.

[547] This issue also is one of causation. We could find that Rambus's deceptive course of conduct caused the ensuing anticompetitive effects because JEDEC members had become locked in before they could take effective countermeasures, and thus were unable to avoid Rambus's royalties. If, on the other hand, JEDEC members had obtained the necessary knowledge of Rambus's patent position at a time when they still were economically capable of switching technologies – but deliberately chose not to switch – the chain of causation would have been broken, and Rambus's monopoly power would not be attributable to its deceptive course of conduct.

Complaint Counsel's economic expert, McAfee, described lock-in as "something that grows over time. It's certainly been accomplished by the time that ramp-up starts."[548] McAfee reasoned that before the time DRAM production ramps up, most of the sunk investments in complementary goods must have been made, because "in order to deploy the standardized [DRAM] product in volume, it requires those complementary goods."[549] The progressive accumulation of switching costs gradually contributes to lock-in,[550] and most of the switching costs for both DRAM manufacturers and producers of complements accrue by the time DRAM production ramps up.[551]

Manufacturers ramped up SDRAM production around 1996.[552] SDRAM represented 78.4 percent of

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[548] McAfee, Tr. 7444-45. McAfee defined ramp-up as the time "when the volume [of DRAM production] starts to dramatically increase." *Id.* at 7445.

[549] McAfee, Tr. 7445-46 ("they're not going to produce the DRAM for inventory in any large volumes and just sit on them hoping that the complementary goods would be provided in the future").

[550] Switching costs accumulate for manufacturers of DRAMs and of compatible, complementary components as they move from the standard-setting process, to designing chips and products that conform to the standard; testing and verifying those designs; building, testing, and qualifying prototypes; and ramping up production on a commercial scale. At each stage the manufacturers make sunk investments that have to be repeated in order to switch to an alternate design. *See* McAfee, Tr. 7444, 7453-54; Shirley, Tr. 4152-54.

[551] *See* Peisl, Tr. 4452-53 (a change to SDRAM that would have been "relatively easy" in 1992 would have been "near impossible" in 2000).

[552] McAfee, Tr. 7442 (ramp-up for SDRAM was "roughly 1995 or 1996"); *id.* at 7446 ("[T]he volume production start[ed] in the 1996-1997 time frame. And so that corresponds to the ramp-

DRAM revenues by 2000.[553] DRAM manufacturers, component manufacturers, and systems OEMs testified that changing SDRAM to work around Rambus's patents in 2000 would have presented significant financial and technical difficulties.[554] For example, a witness from HP testified that by the time he learned of Rambus's patent claims in 2000, changing SDRAM to avoid Rambus's patent enforcement efforts would have been "[w]ay too expensive" for HP, whose SDRAM-based server

> was already out, qualified and you know, we sold to customers and you cannot change something like this after it was designed and already shipped, and if you do change it, you're talking

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up."). SDRAM accounted for less than 2.9% of DRAM revenue in 1995, 4.3% in 1996, and 33.5% in 1997. Rapp, Tr. 10248. Revenues, of course, lag behind production. *See also* Rambus Inc.'s Response to Complaint Counsel's Proposed Findings of Fact, No. 577 (Oct. 1, 2003) ("Although SDRAM represented a relatively small percentage of the DRAM market in 1996, it was certainly 'volume' production.").

[553] Rapp, Tr. 10100-01.

[554] Witnesses from Infineon and Micron, respectively, stated that by 2000 the level of SDRAM development and implementation made substantial changes "very costly and . . . near impossible," Peisl, Tr. 4443-44, and "virtually impossible," Appleton, Tr. 6399. CPU manufacturer AMD stated that changing SDRAM to work around Rambus patents in 2000 would have introduced "a whole host of problems" and would have been "a major, major concern for AMD." Heye, Tr. 3731-34. Cisco Systems explained that changes to memory in 2000 would have imposed "tremendous cost to Cisco to redesign the existing boards and systems Cisco was shipping." Bechtelsheim, Tr. 5881-82. Graphics processor/chipset designer nVIDIA stated that changing SDRAM in 2000 would have put it through a "painful process" of changing its development plan and redesigning its products. Wagner, Tr. 3862-63.

> about millions and millions of dollars in expenses. It wasn't even going to be considered.[555]

Similarly, an IBM e-mail from April 2000 states, "we have gone way too far with SDR [SDRAM] to even consider talking about" switching to fixed latency.[556] Redesigning programmable burst length at that time would have presented similar difficulties.[557]

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[555] Krashinsky, Tr. 2782-83. According to the HP witness, providing multiple latencies without using programmable CAS latency would have required changes to the memory module, the motherboard, and the memory controller. *Id.* at 2784-87. He characterized changing programmable CAS latency "a major change," *id.* at 2788, although he indicated that significantly less change would have been required if a fixed CAS latency would have sufficed. *Id.* at 2804-05. Joe Macri of ATI Technologies (ATI) stated that graphics system designer ATI would have incurred "a huge burden" if JEDEC had changed to fixed latency. Macri, Tr. 4764-65 (*in camera*). *See also* Jacob, Tr. 5377-78, 5569 (use of multiple fixed latencies would have caused compatibility problems absent either greater user understanding as to which latency value was needed or development of a more sophisticated memory controller).

[556] RX 1626 at 3. When the possibility of changing the SDRAM standard regarding programmable CAS latency was discussed within JEDEC in March 2000, it was "very poorly received" because of lock-in concerns. *See* Rhoden, Tr. 533; Kellogg, Tr. 5196-200; RX 1626 at 2.

[557] *See* Peisl, Tr. 4450-53 (removing programmable burst length in 2000 would have been "nearly impossible," with a "huge impact" on DRAM customers). Using a burst terminate command to set burst length would have required "an enormous amount of redesign"; it may have required "almost a full redesign of the graphics pipeline" and at a minimum would have meant design modifications and a "big disruption of [ATI's] engineering plans." Macri, Tr. 4776-77 (*in camera*). *See also* Jacob, Tr. 5572-73 (switching to fixed burst length would introduce incompatibilities in some systems and would have design implications similar to those for switching to fixed CAS latency).

The issue of timing was particularly critical in the DRAM market: the time it would take to redesign SDRAMs and their complements to avoid Rambus's claimed patents would have been prohibitive. Rambus's engineering expert, Geilhufe, indicated that the changes could have been implemented in six to eighteen months.[558] Most of the previous design projects cited in the record indicate that at least a year likely would have been needed.[559] However, these estimates do not account for additional delays inherent in the standard-setting process itself. Even assuming perfect knowledge of Rambus's patent claims, manufacturers could not have begun immediately to design and implement responsive changes. The industry would have had to agree on how the standard would be changed.[560] This could have added a year or more

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[558] *See* Geilhufe, Tr. 9615. *See also id.* at 9675 (stating that the changes could be accomplished in a six to twelve month time frame).

[559] *See* Bechtelsheim, Tr. 5884 (Cisco would need at least a year to redesign its products to accommodate new memory standards); Reczek, Tr. 4341-45, summarized in DX 45 (estimating "24 months plus" to design, assemble, test and qualify a new DRAM); Peisl, Tr. 4375-77 (Infineon's reworking of a flawed SDRAM design took approximately one year to repeat various steps); Heye, Tr. 3673-74, 3677-78, 3767-69 (it typically takes AMD between 15 months and two years to design and implement a new chipset and other complementary infrastructure for its microprocessors); Polzin, Tr. 4016-18 (AMD developed a chipset in 9 months and ushered a new motherboard to mass production in 18 months). Rambus cites testimony that Hyundai made the initial transition from SDRAM to DDR in nine months, *see* CX 2108 at 45 (deposition transcript at 237) (Oh FTC Dep.) (*in camera*), but Complaint Counsel cite documentary evidence indicating that it actually took 15 months, *see* CX 2334 at 20.

[560] *See* Krashinsky, Tr. 2792 ("It has to be defined as a standard and be accepted by the industry as a standard before HP

to whatever time would have been required to make the changes.[561] Such delays would have meant missed opportunities, which firms in the industry found unacceptable.[562]

We are unpersuaded by Rambus's argument that switching costs were insufficient to establish lock-in. Rambus attempted to quantify the switching costs for DRAM manufacturers to design around its patents

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would adopt it and we'll start spending money on doing it."), 2817 (designing can begin once specifications are well enough settled that further changes will not affect the design). No individual DRAM or component manufacturer likely would have been able to adopt non-compliant technology. *See, e.g.*, Macri, Tr. 4768 (*in camera*) (explaining that if graphics system producer ATI changed its controller to conform to an alternative to programmable CAS latency, "we would essentially have a nice paperweight" absent "a device to talk to").

[561] *See* Krashinksy, Tr. 2792 (passing a revised SDRAM standard likely would take "a year or longer even"); Heye, Tr. 3736 ("it's hard to get a consensus of change . . . all of that takes time"); Peisl, Tr. 4453 ("JEDEC is traditionally a very slowly moving consortium . . . because there's so many companies involved . . . so to try to reach consensus at JEDEC, based on my experience, [would] have been incredibly hard and tough."). *See generally* Geilhufe, Tr. 9675 (stating that his time estimate included no allowance for JEDEC consideration).

[562] *See, e.g.*, Wagner, Tr. 3862-63 (explaining that eliminating programmable CAS latency and programmable burst length would have delayed introduction of its graphics products that were "aligned to the timelines" of new computer games: "If we can't release the chip because we have to go redesign for some new technology, then, you know we miss the opportunity to align with this new game . . . ."); Heye, Tr. 3736 ("all of that takes time, and time is something that you don't have in this market"); Shirley, Tr. 4208-09 (*in camera*); Macri, Tr. 4600 ("Time to market is extremely critical in this world"); Kellogg, Tr. 5199; Lee, Tr. 6635, 6684; McAfee, Tr. 7457 ("delay is in itself inherently costly").

on SDRAMs. Rambus's experts testified that a DRAM manufacturer would incur switching costs of $4.3 million to convert from programmable CAS latency and programmable burst length to fixed CAS latency and fixed burst length.[563] Rambus's economic expert, Rapp, argued that $4.3 million is small in relation to the royalties that are being charged by Rambus.[564] The ALJ accepted both Rambus's switching cost estimate and Rapp's conclusions about the economic impact of these costs.[565]

Rambus's $4.3 million figure substantially understates switching costs for three principal reasons. First, Rambus understates or omits certain individual switching cost elements, including mask costs,[566]

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[563] According to Geilhufe, each fixed latency or burst length part would require $100,000 in design costs, $50,000 for photo tools (masks), and $250,000 for qualification. Geilhufe, Tr. 9575-79, 9594-95. Rapp calculated that matching the three latencies and four burst lengths found in JEDEC's SDRAM specifications would require seven new designs, twelve sets of tools, and twelve qualifications, for a total $4.3 million. Rapp, Tr. 9885-86. A lower estimate would flow from Rapp's methodology if the alternative supported fewer latencies or fewer burst lengths than SDRAM. Although we have suggested that two latencies and two burst lengths may have been a reasonable alternative at the time the SDRAM standard was adopted, *see supra* Section IV.C.3.b., subsequent commitments to particular latency or burst length values would have to have been considered in 2000. The Initial Decision, for example, identifies three latency values and three burst lengths in use for main memory or graphics purposes. *See* IDF 1146, 1220, 1223. *See also* RX 1626 at 3.

[564] Rapp, Tr. 9887 ("a small price to pay").

[565] IDF 1652-55.

[566] In contrast to Geilhufe's estimate of $50,000 to switch masks, Micron's Brian Shirley testified that the mask set for a specific DDR SDRAM revision design in 2001 cost $334,000,

inventory costs,[567] and opportunity costs.[568] Second, Rambus's figure covers only the switching costs of a single manufacturer at a single plant for a single product. It overlooks – as Rapp acknowledged – that

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Shirley, Tr. 4205 (*in camera*); that the cost of Micron's mask sets in 2002 ranged from $162,000 to $950,000, *id.* at 4231-32 (*in camera*); that the $162,000 figure would have been the same in 1998-99, *id.* at 4279 (*in camera*); and that multiple mask sets typically were required to maintain full production. *Id.* at 4154 (high-volume products require 25-45 mask sets to run in production), 4234-35 (*in camera*). This last consideration may be very significant in a setting where production already has ramped up; the switching costs necessary to reach the same stage with an alternative technology would have to take production needs into account.

[567] Rambus's experts failed to consider any costs for inventory left unsold at the time of a transition. Such inventories could be substantial: Micron, for example, typically held three weeks of finished goods inventory, Shirley, Tr. 4238 (*in camera*), as well as significant quantities of stock in production. *See* Shirley, Tr. 4153 (estimating that it typically took 45-55 days to move from wafer start to completion). Although a phased transition to a new technology might reduce the loss of inventory, the failure to consider any inventory costs whatsoever appears to be a significant omission.

[568] To undertake a product redesign, DRAM or component manufacturers may need to divert resources, such as engineers, from other projects, potentially delaying the introduction of new products. *See, e.g.*, Heye, Tr. 3745; Macri, Tr. 4769 (*in camera*); Appleton, Tr. 6402-03. Rambus takes no account of opportunity costs beyond the salaries of the affected engineers. *See* Rapp, Tr. 10156-58. This fails to consider that engineers' specialized knowledge or team arrangements could make their diversion to a different design project particularly disruptive and could give rise to opportunity costs in excess of their salaries. *See* Shirley, Tr. 4207-09 (*in camera*); McAfee, Tr. 11292-95. Even Rapp acknowledged the possibility that his analysis could miss some surplus value earned by the employer over an engineer's salary. *See* Rapp, Tr. 10158.

each DRAM manufacturer typically offers components with as many as three densities,[569] and would incur switching costs separately for each density.[570] The figure also ignores – as Rapp conceded – that manufacturers with multiple plants might incur some of these costs at each facility.[571] Moreover, Rapp agreed that each affected DRAM manufacturer separately would bear these switching costs and that, as of 1995, there were five to ten major DRAM manufacturers.[572] Multiplying Rambus's $4.3 million estimate – by the number of manufacturers, then by the average number of densities, and then by a figure reflective of the costs that would have to be duplicated in multiple plants – suggests that total costs to DRAM manufacturers could have reached hundreds of millions of dollars. Adjusting for understatements of cost elements would increase that total even more.

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[569] *See* Rapp, Tr. 10144.

[570] *See* Rapp, Tr. 10143-46 ("whatever the switching costs were . . . would be multiplied by the number of parts that they were starting off with").

[571] *See* Rapp, Tr. 10123. Many DRAM manufacturers own multiple manufacturing facilities. *See, e.g.*, Appleton, Tr. 6267-69 (Micron operates five fabrication facilities); CX 2466 at 2 (Infineon operates three manufacturing facilities).

[572] *See* Rapp, Tr. 10124 ("You could multiply this as needed by the number of manufacturers"), 10146. *See also* CX 2747 at 7 (Micron DRAM Update presenting market shares of 18 DRAM manufacturers in early 1999), 15 (showing 16 DRAM manufacturers remaining in September 1999); Gross, Tr. 2309 (8-10 was a "generous" estimate of DRAM manufacturers in 2003); Appleton, Tr. 6259, 6276-6277 (the DRAM industry had consolidated from approximately 20-25 DRAM manufacturers in the early 1980s to 5-6 major DRAM manufacturers and 2-3 smaller manufacturers as of 2003).

Most significantly, Rambus's $4.3 million figure focuses solely on DRAM manufacturers. If JEDEC changed SDRAM, OEMs and manufacturers of complementary components would face substantial switching costs in redesigning their own products.[573] Rambus's estimate omits these costs, although even Rapp conceded that the switching costs of component manufacturers could exceed those of DRAM manufacturers.[574] As a consequence, Rambus's estimate wholly disregards a major source of lock-in. For all of the foregoing reasons, we find Rambus's switching cost estimates to be flawed.

Rambus also argues that the DRAM industry was not susceptible to lock-in because DRAM manufacturers "routinely redesign their products" and the entire industry "quickly and seamlessly" switches between sub-standards.[575] These sorts of changes, however, were not comparable to the revisions that

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[573] Complementary components – such as memory controllers, memory modules, and motherboards – must be compatible with industry-standard DRAM. *See, e.g.*, Peisl, Tr. 4382, 4410, 4402-03; Macri, Tr. 4589 ("A DRAM alone doesn't really do anything. It needs to talk to other things . . . ."); Heye, Tr. 3655-65, 3715; Polzin, Tr. 3954; CX 1075 at 1. For example, changing programmable CAS latency in SDRAM would require HP to redesign and generate "a whole new chip" for its proprietary memory controller. Krashinsky, Tr. 2786. Designing around Rambus's patents may have required changes to the memory controller, the motherboard, the memory module, and the BIOS (basic input/output system, *i.e.*, the built-in software that provides some computer functions without accessing programs from a disk). Heye, Tr. 3733-34, 3742-43; CA A-4.

[574] Rapp, Tr. 10130-31 (adding, however, that component manufacturers' switching costs were likely of the same order of magnitude as those of DRAM manufacturers).

[575] RB at 76-79. *See also* ID at 326-28.

would have been required to avoid patented Rambus technologies. The "redesigns" referenced by Rambus generally involved shrinking the dimensions or changing the density of DRAM chips.[576] The sub-standards were merely addenda to JEDEC standards.[577] The changes for most redesigns and for switches between sub-standards were more easily accomplished than changes in the DRAM technologies upon which the JEDEC standards were based.[578]

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[576] For example, Rambus cites its Proposed Finding 1292, which counts Infineon's various die shrinks and density changes. RB at 76 n. 36; *see also* IDF 1608 (relying on the same evidence). *See* Becker, Tr. 1141 (explaining that density refers to the capacity of a memory chip, the number of pieces or bits of memory it can hold), 1153-54, 1156-57; Reczek, Tr. 4304.

[577] Addenda were add-ons that filled some of the gaps that JEDEC had not specified. Peisl, Tr. 4411-12. They evolved in response to changes in speed of operation. *See* Becker, Tr. 1142; Heye, Tr. 3676-77. Large DRAM customers such as Intel sponsored addenda for varied reasons, such as preventing industry participants from developing incompatible parts, *see* MacWilliams, Tr. 4908-09 (explaining that different manufacturers had introduced "very subtle" differences because they had needed to draw upon a series of JEDEC ballots rather than a comprehensive specification) or to add details relevant to their design needs. *See* Shirley, Tr. 4138-40 (describing Intel's PC100 specification as adding "a low level of detail"); Peisl, Tr. 4411.

[578] *See, e.g.*, CX 2108 at 65-66 (deposition transcript at 257-58) (Oh FTC Dep.) (*in camera*) (describing additional design work required for changing circuitry as opposed to conducting a shrink); CX 2334 at 3 (April 1999 Hyundai presentation stating, "PC100 to PC133 – The Same Die as PC100"). An Infineon witness explained that changes in DRAM type took longer than shrinks and, with consideration of the need to make revisions and to repeat steps, often took longer than changes of density. Reczek, Tr. 4304, 4309, 4336-38, 4341-45, 4350-51 (noting that Infineon needed three major revisions to produce a satisfactory DDR SDRAM device). Although the difference in effort required for individual changes was not large, *id.* at 4341-45, a change to

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the JEDEC-standardized technologies would have required *multiple* revision projects – for example, revising each distinct density of SDRAM and DDR SDRAM – and the total cost would have been some multiple of the cost for an individual change. *See* Rapp, Tr. 10143-44 (agreeing that DRAM manufacturers would "need to make changes to each of the densities of SDRAM or DDR").

Rambus claims that Complaint Counsel's economics expert "admitted that switching cost to avoid Rambus's technologies would be no greater than those routinely absorbed by the industry." RB at 79. McAfee testified that transitions between substandards involved the same "categor[ies] of costs" as transitions between JEDEC standards but that "the size of those costs are substantially less" with the former. McAfee, Tr. 7715. He also testified that the cost of changing interface technologies exceeded the cost of die shrinks. *Id* at 7718-19. Rambus also relies on a 1996 Micron e-mail, RX 836 at 2-3, which does not establish that routine changes in chip size, density, and speed involved the same level of cost and difficulty as changes in JEDEC-standardized technologies.

Rambus further contends that a switch to alternatives for its technologies "could be "piggyback[ed]" on a redesign, and the ALJ agreed. *See* RB at 76; IDF 1656. The only support comes from Rambus's own expert witnesses. *See* Soderman, Tr. 9418; Geilhufe, Tr. 9615, 9675. Witnesses representing DRAM manufacturers, however, consistently testified that they would not normally combine interface technology changes with redesigns. Infineon's Henry Becker, for example, explained, "Typically when you do a shrink, you like to do it on a product that you're already producing so that you don't create – you don't change too many things at once." Becker, Tr. 1157-58. *See also* Reczek, Tr. 4304-05 (testifying that shrinks, density revisions, and changes to the type of DRAM generally were not combined "because if you mix up two different steps, you might run into severe problems, not finding out what the reason for not functioning in the chip is"); CX 2108 at 65 (deposition transcript at 257) (Oh FTC Dep.) (*in camera*) (stating that Hyundai normally did not change internal circuitry at the time of a shrink).

More importantly, the types of changes cited by Rambus raised fewer compatibility issues and, therefore, fewer lock-in implications.[579]

We find that high direct switching costs, combined with significant delays from revising standards and reworking products, rendered infeasible a change in SDRAM to avoid Rambus's patented technologies in 2000 and conferred durable monopoly power with respect to SDRAM.

DDR SDRAM. JEDEC first published the DDR SDRAM standard in 1999. Rambus claims patent protection over technology incorporated into the

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[579] Redesigns and transitions between sub-standards typically affected the dimensions, amount, and speed of main memory, but were less likely to affect compatibility between main memory and other computer components. The JEDEC interface standards, in contrast, were essential to compatibility. They governed, for example, the timing of release of data, the amount of data, and the speed and alignment of transmissions of data transferred between main memory and other computer components. *Compare* IDF 41; CX 1388 at 8; Peisl, Tr. 4382; Heye, Tr. 3769-71; Bechtelsheim, Tr. 5958; McAfee, Tr. 7718-19 (all highlighting the role of Rambus's technologies as part of an interface and describing the resulting compatibility requirements) *with* Becker, Tr. 1157 (from the customer perspective shrinks don't matter – different sizes "all function the same, he gets the same reliability, same performance"); MacWilliams, Tr. 4887 ("we [Intel] made sure [PC100] was backwards compatible with the 66 megahertz"); Polzin, Tr. CX 2334 at 3 (April 1999 Hyundai presentation stating, "PC100 to PC133 . . . – Using Existing Infrastructure of PC100"); CX 2728 at 2 (December 1998 Micron comments to Dell, stating, "PC133 are backwards compatible with PC100" but for DDR, companies are either "in progress with" or "looking to start" DDR chipset designs). *But cf.* Gross, Tr. 2351-53 (stating variously that she was "not sure," "d[id] not recall," and "believe[d] . . . probably" that PC100 was not backward compatible with PC66).

standard relating to dual-edge clocking and on-chip PLL/DLL, in addition to the programmable CAS latency and burst length technologies that carried over from SDRAM.

The DRAM industry was significantly locked in to DDR SDRAM by 2000. DRAM manufacturers had begun production of DDR SDRAMs by that time,[580] and their representatives consistently testified that changes no longer were feasible.[581] Furthermore, the necessary complementary components had to be in

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[580] Hyundai began mass production of its first DDR chip by March 1999. *See* CX 2108 at 45 (deposition transcript at 237) (Oh FTC Dep.) (*in camera*); CX 2334 at 20. Infineon completed design of its 256-megabit DDR SDRAM at the end of 1999. Peisl, Tr. 4377-79 (explaining that enough was known about DDR SDRAM specifications to begin designing even before the standard was finalized, deferring some aspects until JEDEC made the last of its choices), 4454. Infineon was ramping production of its first DDR product by 2000. *Id.* at 4455. *See also* Crisp, Tr. 3432 (DDR SDRAM was in production in 1998); CX 2726 at 3 (64 Mb DDR SDRAM was available as early as 1998); RX 885A at 1 (Samsung planned to begin mass production of 64 Mb DDR in 1998, and Fujitsu was on a similar schedule). *See generally* CX 2158 at 2 ("Micron Demonstrated DDR in a PC in Fall 99"); CX 2387 (January 1998 IBM e-mail stating that engineering hardware would be available for IBM DDR SDRAMs by the second quarter of 1998, with qualification expected by the end of 1998); G. Kelley, Tr. 2589-91 (IBM began design of DDR SDRAM features selected by JEDEC in late 1996 or the first half of 1997); CX 957 at 2 (LG Semiconductor was working on DDR SDRAM by 1997 – it had assigned its SDRAM team to DDR tasks). DDR SDRAM revenues rose rapidly from .4% of DRAM revenue in 2000 to 5.3% in 2001. Rapp, Tr. 10248-49. Because revenues lag behind production, the market share data are consistent with a significant production ramp in 2000.

[581] *See, e.g.*, Peisl, Tr. 4443-44; Appleton, Tr. 6386-87, 6399-401.

place before substantial sales were possible.[582] AMD, for example, launched a DDR-based system in October 2000; the general manager of its microprocessor unit, Richard Heye, testified that product development had gone too far to change DDR SDRAM by the time that a response to Rambus's patents could have been considered:

> We were planning a launch in the fall of 2000, October. By that time frame, the chipset was for all intents and purposes complete, we were in the validation testing, the DDR, the DIMMs, the memory was done, the DIMMs were being manufactured, the memory folks were actually starting production and waiting for it to start . . . .[583]

Similarly, HP's Krashinsky testified that DDR SDRAM already had been installed in HP server prototypes by about the third quarter of 2000.[584] Cisco's

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[582] *See* CX 2747 at 58-60 (September 1999 Micron DRAM Update stating that DDR controllers for graphics purposes were already available and that multiple chipset vendors were "developing support"); Peisl, Tr. 4455-57 (by 1999-2000 the "customers had progressed in their designing of platforms and have SDR and DDR quite a bit already. There were DDR chipsets available."); McAfee, Tr. 7445.

[583] Heye, Tr. 3737. *See also id.* at 3738 (stating that AMD by 2000 was in the midst of testing DDR memory from all the vendors to ensure that all combinations were going to work with its chipset); CX 2158 at 2 (June 2000 AMD e-mail stating, "AMD powered on the first K7 DDR chipset (IGD4) in Dec 99"). *But cf.* Heye, Tr. 3750 (noting that the infrastructure of DDR-based complements was still developing in 2000 and had not yet been established in the marketplace).

[584] Krashinsky, Tr. 2793. Krashinsky added that if HP had needed to change the chipset that was designed for use with

Bechtelsheim stated that a change in DRAM design in response to Rambus's assertion of patents in 2000 would have imposed "a tremendous cost to Cisco to redesign the existing boards and systems Cisco was shipping to accommodate this new type of memory."[585]

The adoption of programmable CAS latency and burst length in the DDR SDRAM standard raises the same issues as in SDRAM. The cost and delay associated with changing these technologies in SDRAM were equally applicable to DDR SDRAM.[586] Indeed, JEDEC rejected a March 2000 proposal to move to fixed latency in DDR SDRAM, and lock-in concerns were a significant factor.[587]

The DDR SDRAM standard adopted two additional technologies that Rambus now claims to have patented: dual-edge clocking and on-chip PLL/DLL. As to dual-edge clocking, Complaint Counsel's engineering expert testified that redesigning DDR SDRAM to avoid Rambus's patents would have required changes

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DDR in this server, it would have had to change all of the other products that also used that chipset. *Id.* at 2797.

[585] Bechtelsheim, Tr. 5881. Bechtelsheim estimated that redesigning and requalifying its products in order to accommodate changes in DRAM technology would cost between $500,000 and $1 million for each distinct PC board assembly, so that total cost to Cisco "could approach or exceed $1 billion." *Id.* at 5882.

[586] *See, e.g.*, Wagner, Tr. 3862-63; Peisl, Tr. 4450-53; Macri, Tr. 4764-65 (*in camera*), 4775-77 (*in camera*); Kellogg, Tr. 5196-200. *See generally* Polzin, Tr. 3992-94 ("The problem was, we'd have to change everything in the middle of this production ramp.").

[587] *See* Rhoden, Tr. 532-33 (stating that his proposal to change to fixed latency "was very poorly received within the committee, because there were products shipping in pretty high volume at that time").

to the clock chip and the memory controller.[588] Producers of complements and OEMs voiced lock-in concerns. For example, AMD's Polzin testified that, by the summer of 2000, the firm was in the middle of a production ramp for DDR-based controllers and motherboards, and "[i]t would have been impossible for us to stop and change" the dual-edge clocking mechanism.[589] Likewise, Krashinsky explained that HP did not seek a change in JEDEC's DDR SDRAM standard, even after learning of Rambus's patent claims on dual-edge clocking, because HP already had developed a server prototype dependent on DDR SDRAM, HP was "counting on" that standard, and "HP does not want to support changes that will cause a lot of expenses to HP."[590]

The record also establishes that on-chip PLL/DLL was similarly locked-in at this time. AMI-2's Rhoden testified that a proposal in 2000 to change DDR SDRAM to replace on-chip DLL would have been a waste of time in view of "wide industry use and high volume production."[591] Joe Macri of ATI Technologies (ATI), speaking in terms of the subsequent DDR2 SDRAM standard, described removal of on-chip DLL as "not something you can change in a trivial manner," adding, "You really need a gun to your head."[592]

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[588] Jacob Tr. 5413, 5433, 5575-76.

[589] Polzin, Tr. 3980, 3989, 3995-96. *See also* Macri, Tr. 4649-51 (removing dual-edge clocking in 2000 would mean "you're shaking the foundations . . . of the standard and not changing a minor piece").

[590] Krashinsky, Tr. 2793-94.

[591] Rhoden, Tr. 533.

[592] Macri, Tr. 4649. *See also* Jacob, Tr. 5577-78 (compatibility dependent on system design), 5617-18 (compatibility dependent

Consideration of DDR SDRAM also introduces concerns regarding backward compatibility, especially with reference to dual-edge clocking. Backward compatibility requires that it be economically feasible to produce complementary components capable of supporting both an old and a new generation of DRAM. As witnesses explained, it would have been difficult to design a memory controller that would be compatible both with existing DDR SDRAMs and with any revised version that avoided dual-edge clocking. Micron's Lee termed this "a very difficult design to accommodate,"[593] and ATI's Macri stated that switching to single-edge clocking would have had "a big impact" from "a design point of view."[594] Macri cited the need to retain backward compatibility as a reason why avoidance of Rambus's patents was not feasible.[595]

Rambus argues that, despite this evidence, the industry was not locked into DDR SDRAM in 2000. Rambus provides no estimates of the switching costs for changing dual-edge clocking and on-chip PLL/DLL. Rather, Rambus argues, and the ALJ agreed, that the fact that JEDEC actively considered alternatives for the Rambus technologies in 2000 shows that JEDEC could not have been locked in.[596]

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on data arriving at the controller in the appropriate timing window).

[593] *See* Lee, Tr. 6805-06.

[594] Macri, Tr. 4780-81 (*in camera*).

[595] Macri, Tr. 4765, 4767-68, 4773, 4780-81 (all *in camera*). *See generally* Krashinsky, Tr. 2829 (members deemed switching to a single-edge clock "too dramatic" a change).

[596] IDF 1585; RB at 75. The ALJ's finding of fact cited only Complaint Counsel's economic expert. McAfee, however, actually offered much more limited testimony – though he would not "take it as proof," he would not expect JEDEC members to

We disagree. JEDEC ultimately *rejected* all of the alternatives. In view of the record as a whole, the fact that the industry was aware of alternatives, but did not switch to them after the adoption of the standard, supports our finding that JEDEC members decided that expenses and delays rendered switching infeasible.

Rambus asserts that switching from DDR SDRAM in 2000 would have been easy. In addition to arguments based on the relative ease of developing new DRAM sizes, densities, and speed grades,[597] Rambus cites an April 2000 Hitachi e-mail stating that "it's not too late for minor, carefully considered changes" to the DDR SDRAM standard.[598] We find that this single e-mail, which addressed only programmable CAS latency,[599] does not accurately reflect the costs and delays described by other industry participants.

"spend a lot of time discussing technologies in 2000" unless "at least some significant number of members" thought those technologies were commercially viable. McAfee, Tr. 7571.

[597] *See supra* notes through and accompanying text.

[598] RX 1626 at 4 (e-mail dated April 10, 2000 by Hitachi employee Bob Fusco stating "For DDR-1, it's not too late for minor, carefully considered changes, so I'm open to either proposal [for eliminating programmable CAS latency]"). At the time this e-mail was written, Rambus recently had commenced suit against Hitachi for willful infringement. CX 1855 at 6, 8-9, 11. It is possible that any post-complaint Hitachi documents memorializing an openness to explore non-infringing alternatives may have been influenced by Hitachi's litigation posture.

[599] The e-mail states nothing about changes to programmable burst length, dual-edge clocking, or on-chip PLL/DLL. RX 1626 at 4. Of course, programmable CAS latency was only one of multiple technologies included in the JEDEC standards and later subject to Rambus's patent claims.

In summary, we conclude that lock-in was significant by 2000 with regard to DDR SDRAM and gave rise to Rambus's durable monopoly power.

DDR2 SDRAM. The record does not support a finding that lock-in conferred durable monopoly power over DDR2 SDRAM by 2000. There is evidence that work on DDR2 SDRAM was underway by spring 1998.[600] Macri, the JEDEC representative from ATI and chairman of the task group responsible for developing a successor to DDR SDRAM, testified that in April 1998 the group began to engage in the "initial set of discussions on the DDR2 standard" and "things came in, things came out, but by June 2000, we, you know, we had hit a – kind of a stable point."[601] He added that the technical details for the proposed standard were fleshed out between June 2000 and June 2001.[602] JEDEC published the DDR2 SDRAM standard to its members in 2002, but final revisions still were being completed in June 2003.[603]

DDR2-based product design and development was in its early stages by 2000. For example, Micron started design work on DDR2 SDRAMs in late 1999,[604] and its first DDR2 design was "taped out"

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[600] Macri, Tr. 4582; CX 376a (March 1998 e-mail announcing "Future dram task group kickoff"); CX 379a (April 1998 Future DRAM Task Group meeting notes).

[601] Macri, Tr. 4598.

[602] *See* Macri, Tr. 4598-99 ("during June of 2000 to June of 2001, we were adding the meat, you know, the real description that an engineer would need to truly understand these – these concepts").

[603] *See* Rhoden, Tr. 411-12; Polzin, Tr. 4046.

[604] Shirley, Tr. 4211 (*in camera*). IBM's Gordon Kelley explained that design work may begin on aspects of the DRAM that are not covered by JEDEC standards. G. Kelley, Tr. 2590.

(*i.e.*, ready for initial transfer to masks) in January 2002.[605] The head of JEDEC's Future DRAM Task Group characterized JEDEC deliberations as fluid until first reaching a "stable point" in June 2000.[606] An April 2000 e-mail by Hitachi's Bob Fusco stated, "For DDR-2, we have no legacy to live with, so I like the Micron proposal [to avoid programmable CAS latency]."[607] Complaint Counsel point out that some firms had begun work on DDR2-based products by 2000.[608] However, the scope and extent of DDR2-related efforts is unclear, particularly when one contrasts the unambiguous statements that work had progressed too far to permit change to the SDRAM and DDR SDRAM standards. The evidence suggests that there would have been DDR2 switching costs by 2000, but provides little sense of their magnitude.

Some component manufacturers had started work on DDR2-based complements by 2000. For example, initial JEDEC-level work on the attributes of DDR2-based memory modules began as early as February 1999.[609] However, IBM's Bill Hovis wrote in April 2000 e-mail that, as to DDR2 SDRAM, "[o]bviously here, the situation with the system is that I am not

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[605] Shirley, Tr. 4228 (*in camera*).

[606] Macri, Tr. 4598.

[607] RX 1626 at 4.

[608] *See, e.g.*, Macri, Tr. 4648 (by September 2000 "there were already companies in design on both the DRAM and the systems side"), 4649 (changes at this time would have affected "earliest adopters"), 4650-51; Kellogg, Tr. 5201 (in September 2000 IBM was "moving down the path" of designing its first DDR2-based memory controllers), 5204 (eliminating dual-edge clocking likely would mean "measurable schedule delay" for IBM's memory controller project).

[609] *See* Kellogg, Tr. 5194-95; CX 393.

currently locked in . . . ."[610] nVIDIA started work on the first product that it thought might prove DDR2-compatible in late 2000 or early 2001.[611] AMD's Polzin stated that, as of the time of his June 2003 testimony, AMD still had not started to develop an infrastructure for DDR2 SDRAM.[612]

Complaint Counsel stress the industry's desire to maintain backward compatibility. Several industry witnesses expressed concerns that changing DDR2 SDRAM to avoid Rambus's patents would have disrupted backward compatibility.[613] One witness testified that an effort to maintain backward compatibility after eliminating dual-edge clocking would have had "a big impact" from the perspective of design and that a desire to maintain backward compatibility was the reason that a sub-unit of JEDEC's task group in October 2000 chose to maintain dual-edge clocking.[614]

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[610] RX 1626 at 3. The e-mail addressed only issues regarding CAS latency. *Id.* at 3-4.

[611] Wagner, Tr. 3866-67.

[612] Polzin, Tr. 4043-44.

[613] *See, e.g.*, Macri, Tr. 4678 (changing to fixed latency would have been a disruptive departure from DDR SDRAM base), 4624 (on-chip DLL retained "to keep the backwards compatibility"), 4647-48 (similar), 4649 (Macri did not propose eliminating dual-edge clocking because of backward compatibility concerns), 4678-79 (JEDEC task group thought eliminating dual-edge clocking would have been "disruptive"); Kellogg, Tr. 5192-93 (describing consensus desire in 1998 to achieve an "evolutionary solution" that would sustain backward compatibility); Lee, Tr. 6805-06 (very difficult to design a controller that would be compatible with both dual-edge and single-edge clocking).

[614] *See* Macri, Tr. 4640-42, 4780-81 (*in camera*); *cf.* Krashinsky, Tr. 2829 (JEDEC task group rejected alternative to dual-edged clocking because of "the cost that it would be to imple-

Contemporaneous documents confirm that backward compatibility was a general goal, but do not conclusively establish that the decisions to retain Rambus's patented technology resulted from that factor.[615] One such example is the minutes of an October 2000 conference call among members of a sub-unit of JEDEC's Future DRAM Task Group, in which elimination of dual-edge clocking was discussed. The minutes conclude, "Single data rate clock is preferred provided that we can make it work."[616] Although "mak[ing] it work" might have encompassed considerations of backward compatibility, the minutes do not expressly state this. Follow-on testimony from the proponent of the change indicated that ultimately "there was not a lot of support," but did not explain the underlying reasons why dual-edge clocking was retained.[617] Based on the existing record, it is difficult to assess

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ment one versus the other" and because the change in clocking rate would have been too "revolutionary").

[615] These documents show that the Future DRAM Task Group decided early on that the next generation of DRAM should "stay backward compatible if at all possible with DDR," CX 392 at 3, and reflect the desire to provide a "migration path" for producers of controllers, CX 379a at 9. The references, however, are too general to reveal how much those considerations shaped the group's specific technology choices. *See also* CX 132 at 4, CX 379a at 9, and CX 2745 at 7 (all indicating that DDR2 SDRAM should be based on DDR SDRAM); CX 2717 at 8, 13 (March 1998 Transmeta Corporation paper urging that change be "evolutionary" and that backward compatibility with DDR SDRAM be maintained).

[616] CX 426 at 4. Macri subsequently interpreted this to mean that "*if* we were to go and do . . . large-scale change" – which, presumably, would have sacrificed backward compatibility – the preference was for eliminating dual-edge clocking. Macri, Tr. 4690-91 (emphasis added).

[617] *See* Lee, Tr. 6802; JX 52 at 45-50.

how substantially backward compatibility concerns contributed to lock-in in 2000.

In summary, there certainly is evidence that eliminating Rambus's patented technologies from the DDR2 SDRAM standard would have entailed some switching costs for some stakeholders, including, but not limited to, switching costs associated with the desire to preserve backward compatibility.[618] However, the record shows that JEDEC published the DDR2 SDRAM standard in 2002. The causal link between Rambus's course of conduct and the incorporation of its patented technology in the DDR2 SDRAM standard in 2002 is not as well-defined as it is for the SDRAM and DDR SDRAM standards for several reasons.

First, the record as to the magnitude of DDR2 switching costs is not clear; evidence is imprecise and mixed. On the whole, the record fails to establish that most stakeholders had invested heavily in the DDR2 standard by 2000, when Rambus's intentions and patents were disclosed. Second, the circumstances when JEDEC published the DDR2 standard in 2002 were materially different from what they

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[618] These considerations rebut the claim that JEDEC's inclusion of Rambus technologies in DDR2 SDRAM demonstrates that those technologies were superior to all alternatives. *See* RB at 52-59; ID at 322-23. Even Rambus recognizes that revealed preference arguments of this nature require that "all other things be[] equal." RB at 60 n.29. Yet in the case of DDR2 SDRAM, other things were *not* equal. Switching costs were present, and JEDEC's choice, at most, revealed a preference for Rambus technologies over alternatives handicapped by those switching costs. Moreover, uncertainties over the breadth and enforceability of Rambus's patents further blurred the comparisons on which Rambus relies. *See infra* notes - and accompanying text.

were when the SDRAM and DDR SDRAM standards were adopted. To begin with, Rambus had disclosed both its patents and its intent to enforce them in 2000, at least two years before the DDR2 standard was published. By 2002, Rambus had largely lost the *Infineon* litigation in the trial court.[619] Consequently, the prospect of substantial royalty costs did not loom as the threat it likely would have posed in earlier years (or the threat that it later posed after the Federal Circuit reversed the *Infineon* district court in January 2003).[620] Thus, it seems likely that the DDR2 decisions of JEDEC members would have been impacted by a then-current perception that incorporation of Rambus's allegedly patented technology in JEDEC's DDR2 standard would be relatively costless.

We conclude that the record does not establish a causal link between Rambus's exclusionary conduct and JEDEC's adoption of DDR2 SDRAM.[621]

4. Rambus's Claim that its Acquisition of Monopoly Power Did Not Matter

Finally, Rambus claims that even if its course of conduct enabled it to acquire monopoly power, it cannot be held liable because Complaint Counsel failed

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[619] The trial court granted Infineon judgment as a matter of law on May 2, 2001. *See* Rambus, Inc. v. Infineon Techs. AG, 318 F.3d 1081, 1086 (Fed. Cir. 2003).

[620] Even then, patent enforceability remained uncertain.

[621] Although we do not, on this record, find durable monopoly power as to DDR2 SDRAM, neither do we rule it out. It is possible that Rambus did, in fact, obtain durable monopoly power over DDR2 SDRAM. We might have found lock-in with respect to DDR2 SDRAM if the record had demonstrated, for example, that backward compatibility concerns were a substantial determinative factor in JEDEC's DDR2 SDRAM standard-setting decisions.

to prove competitive harm in the form of supracompetitive (or "unreasonable") prices for consumers. Rambus argues that the royalties paid by DRAM manufacturers are mere wealth transfers, suggesting that the royalties impose only private costs that are irrelevant to overall social welfare. We reject this argument. It fails to acknowledge any decline in DRAM output that might result from higher DRAM prices. Reduced output would constitute a deadweight loss that decreases overall social welfare and raises competitive concerns – as even Teece, Rambus's economic expert, has acknowledged elsewhere.[622]

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[622] *See* Teece & Sherry, *supra* note , at 1931 n.74 (deadweight loss must be weighed against any real-resource cost savings from use of a patented technology).

The ALJ carried that error one step farther. The Initial Decision relies on a purported admission by Complaint Counsel's economic expert, McAfee, that Rambus's conduct "has had no impact on DRAM prices, no effect on consumers, and no effect on the PC market as of the time of trial . . . ." IDF 1053; ID at 323-24. This misses the point of McAfee's testimony. McAfee actually testified that, although he did not believe there had been an impact on DRAM prices "as of today," (1) Rambus's conduct had substantially increased price in the relevant technology markets and (2) "in the long run . . . those royalty costs would be passed on to consumers" with "the effect of lowering output in the downstream DRAM market" and "the effect of increasing the price." McAfee, Tr. 7175-76, 7565-66. McAfee reasoned that, in the short run, DRAM manufacturers face such high fixed costs that they will maximize the output of their facilities irrespective of royalty levels, but in the long run, higher royalty costs will lead to less DRAM production capacity and higher DRAM prices. *Id.* at 7175-76, 7208, 7749-50; *see also* CX 839 at 2 (1995 Crisp e-mail indicating that Hyundai, a DRAM manufacturer, stated "that they pass on license fees and royalties to their customers"); CX 2107 at 140-41 (Oh FTC Dep.) (*in camera*) (Hyundai's DRAM prices to customers were a func-

Rambus also argues that its conduct had no anti-competitive effect because its royalty rates have been reasonable.[623] Substantial record evidence shows that Rambus's royalty rates are *not* reasonable.[624] Ulti-

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tion of production costs). Neither the ALJ nor Rambus cite any authority for the proposition that a showing of long-run DRAM output reductions and price increases is insufficient to demonstrate competitive harm. Thus, we find no basis in McAfee's testimony for rejecting Complaint Counsel's showing of competitive harm.

[623] RB at 72-74.

[624] A comparison of Rambus royalty rates for DDR SDRAM and RDRAM strongly suggests that Rambus's DDR royalties have not been reasonable. Rambus has charged at least a 3.5% royalty on DDR SDRAM, *see, e.g.*, Rapp, Tr. 9853; CX 1680 at 4 (*in camera*), but generally has negotiated royalties between 1.0% and 2.0% for RDRAM. *See, e.g.*, CX 1592 at 21-23 (Samsung RDRAM License); CX 1646 at 10-11 (Micron RDRAM License); RX 538 at 20-22 (NEC RDRAM License); CX 1612 at 4-5 (Hyundai RDRAM License); CX 547 at 12; CX 1057. (RDRAM royalties cover all four of the technologies at issue in this proceeding, as well as additional proprietary technologies. *See, e.g.*, Horowitz, Tr. 8547-48; RX 2183; RX 81 at 8.) Thus, Rambus's 3.5% royalty for DDR SDRAM far exceeds the royalties that were negotiated for RDRAM in a setting in which licensees were aware of Rambus's patent position from the start and, consequently, were sheltered from hold-up.

Rambus attempts to establish the reasonableness of its royalties by comparing them to royalty rates charged for *other* technologies. *See* RB at 73; Teece, Tr. 10422-51. Rambus CEO Tate, however, testified that comparing royalty rates for different technology licenses mixes "apples and oranges" because "[t]he royalty rate for one patent and the royalty rate for another patent, even in the [semiconductor] industry, can vary tremendously based on the value of the patent and the applications involved." CX 2060 at 158 (Tate *Infineon* Dep.) (*in camera*). Rambus fails to provide a basis for treating the referenced licensing arrangements as comparable to licenses for the technologies at issue in the present case. *See* Teece, Tr. 10465-66

mately, however, we need not rest on this evidence. Deceptive conduct that confers durable market power by its very essence harms competition, and claims that the offender has not yet behaved like a monopolist provide no shelter.[625] We therefore reject this argument as a matter of law.

(unable to identify any comparative data that involved royalties on DRAM interface technologies), 10644-46, 10659-60 (acknowledging "a lot of heterogeneity" in royalty rates).

Both Rambus and the ALJ highlight a comparison to IBM's patent licensing policy. They state that IBM charged royalties of 1-5% and that Rambus's rates fit well within this range. RB at 73-74; IDF 1548-53; ID at 324-25. The record contains no evidence, however, that IBM's rates reflected royalties for DRAM technologies, or even that the rates stated in IBM's policy ever actually applied. *See* Teece, Tr. 10638-40 (acknowledging that IBM usually cross-licensed without a cash rate). Indeed, even the IBM policy cited by Rambus gave licensees a potentially much less costly option: licensees could choose an 8% royalty based solely on the portion of the selling price attributable to the patented portions of the licensee's product. JX 9 at 24. For a DRAM, in which the four relevant interface technologies are only a small part, the IBM policy might result in only a minimal royalty.

[625] *See* United States v. Microsoft Corp., 253 F.3d 34, 56-58, 76-77 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001), quoting Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 274 (2d Cir. 1979), *cert. denied*, 444 U.S. 1093 (1980) ("[I]f monopoly power has been acquired or maintained through improper means, the fact that the power has not been used to extract [a monopoly price] provides no succor to the monopolist."); American Tobacco Co. v. United States, 328 U.S. 781, 809, 811 (1946); *see also* III AREEDA & HOVENKAMP, ANTITRUST LAW, ¶ 651d1 at 80 ("Properly defined monopolizing conduct harms consumers by creating monopoly, increasing its amount, or extending its duration. Thus, an expectation of consumer harm must always be at the logical end of any determination that a particular act 'monopolizes,' and thus satisfies §2's conduct requirement.").

V. SPOLIATION

Allegations that Rambus engaged in the spoliation of evidence have permeated these proceedings, as well as several private actions relating to Rambus's patent enforcement efforts.[626] Many of the basic facts are not in dispute.[627] Rambus began formulating its document retention policy in early 1998 with the assistance of outside counsel,[628] and adopted a document retention policy in July 1998.[629] Rambus then conducted company-wide "shred days" in September 1998 and August 1999 that involved the destruction of significant quantities of documents.[630] Rambus destroyed a similarly large volume of documents in December 2000 when it moved to a new office building.[631] As part of its document destruction efforts,

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[626] *See supra* Section II.B. (discussing the relevant procedural history).

[627] Our discussion draws upon evidence developed in the *Infineon* litigation, pertaining to the nature and extent of Rambus's document destruction effort. This evidence was admitted in this proceeding by a reopening of the record. *See* CX 5000-85; DX 500-07; RX 2500-53; *see also supra* Section II.B.1.d.

[628] *See* CX 5005 at 3; CX 5006 (designated R401111); CX 5007; CX 5069 at 11 (deposition transcript at 376) (Karp 2004 *Infineon* Dep.); CX 5068 at 4-5 (deposition transcript at 26-33) (Savage 2004 *Infineon* Dep.); RX 2502 (March 1998 Rambus memorandum regarding "Document Retention Policy Guidance"; RX 2521 at 11-12 (Johnson *Infineon* Dep.).

[629] *See* RX 2503; CX 2102 at 362 (Karp *Micron* Dep.).

[630] Rambus destroyed 185 burlap bags and 60 boxes full of documents on September 3, 1998. CX 5023 (designated R401307); CX 5050 (designated R400812). Rambus destroyed approximately 150 burlap bags of documents on August 26, 1999. CX 5052 (designated R400819).

[631] *See* CX 5053 (designated R400787) (Rambus destroyed 410 burlap bags).

Rambus deleted e-mails,[632] erased computer backup tapes,[633] and instructed its outside patent counsel, Lester Vincent, to clean out his law firm's patent prosecution files so that they mirrored the PTO's file.[634]

The record shows that key Rambus executives and lawyers – including Richard Crisp,[635] Joel Karp,[636] Billy Garrett,[637] Anthony Diepenbrock,[638] and Lester Vincent[639] – destroyed documents. The record also shows that some of these documents related to subject matter pertinent to this proceeding, such as documents regarding Rambus's participation in JEDEC,[640] and Rambus's patent prosecution files.[641]

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[632] *See* CX 1264 at 1 ("EMAIL – THROW IT AWAY"); Diepenbrock, Tr. 6230-32.

[633] *See, e.g.*, CX 5018.

[634] *See* CX 5033; CX 5036; CX 5037 (designated BSTZ 41); CX 5069 at 49 (deposition transcript at 540-41) (Karp 2004 *Infineon* Dep.). (BSTZ refers to Bates stamp numbers that appear on this and other exhibits admitted into this record from the *Infineon* litigation.)

[635] *See* Crisp, Tr. 3425, 3427-30; CX 2082 at 157-59 (deposition transcript at 841-43) (Crisp *Infineon* Dep.) *(in camera)* ("anything that I had on paper, I basically threw away"); CX 5059 (designated GCWF 3456). (GCWF refers to Bates stamp numbers that appear on this and other exhibits admitted into this record from the *Infineon* litigation.)

[636] *See* CX 2059 at 62 (Karp *Infineon* Dep.) (*in camera*); CX 2102 at 115 (deposition transcript at 378) (Karp *Micron* Dep.).

[637] *See* CX 5062 (designated GCWF 3422).

[638] *See* CX 5064 (designated GCWF 3439); Diepenbrock, Tr. 6235-36.

[639] *See* CX 5033; CX 5036; CX 5037 (designated BSTZ 41).

[640] *See* CX 5062 (designated GCWF 3416); CX 5078 at 14 (trial transcript at 124), 20 (trial transcript at 146).

Indeed, Rambus's document destruction efforts were so thorough and effective that neither Crisp nor Rambus's attorneys were able to find certain JEDEC-related documents when they subsequently searched for them.[642]

In order to establish pre-litigation spoliation, Complaint Counsel must show that Rambus destroyed potentially relevant documents at a time when litigation was reasonably foreseeable.[643] The destruction must have occurred with a culpable state of mind.[644] The appropriate remedy in any particular case typically will vary, depending on the spoliating party's degree of fault as well as the extent to which the other party is prejudiced.[645]

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[641] *See* CX 5033; CX 5036; CX 5037 (designated BSTZ 41); CX 5069 at 49 (deposition transcript at 540-41) (Karp 2004 *Infineon* Dep.).

[642] *See* CX 1079 at 1 (Crisp October 1999 email: "I'm looking for a copy (paper or electronic) of one of the original DDR datasheets from the 1996/1997 timeframe. Hopefully someone here has one that hasn't fallen victim to the document retention policy :-)"); CX 5078 at 20 (trial transcript at 146).

[643] *See* Silvestri v. General Motors Corp., 271 F.3d 583, 590 (4th Cir. 2001); Byrnie v. Town of Cromwell, 243 F.3d 93, 107-112 (2nd Cir. 2001). *See also* MARGARET M. KOESEL ET AL., SPOLIATION OF EVIDENCE: SANCTIONS AND REMEDIES FOR DESTRUCTION OF EVIDENCE IN CIVIL LITIGATION 4-5 (Am. Bar Ass'n 2000).

[644] Courts have articulated this requirement in varying terms. *See, e.g.*, *Silvestri*, 271 F.3d at 590 ("some degree of fault"), 593 ("deliberate or negligent"); *Byrnie*, 243 F.3d at 108 ("intentional[]," "in bad faith," or "based on gross negligence"), 109 ("knowingly . . . or negligently").

[645] *See* Residential Funding Corp. v. DeGeorge Financial Corp., 306 F.3d 99, 107 (2d Cir. 2002); Schmid v. Milwaukee Electric Tool Corp., 13 F.3d 76 (3d Cir. 1994).

In the present case, we need not resolve whether Rambus engaged in spoliation because the record shows, by a preponderance of the evidence, that Rambus engaged in exclusionary conduct. Our findings stand firmly on the evidence that has survived. No remedy for the alleged spoliation is necessary, and we therefore do not undertake the inquiry required to resolve the spoliation issue.[646]

We stress, however, that Rambus's extensive document destruction campaign had the potential to deny the Commission an opportunity to examine thoroughly Rambus's conduct. In some instances, the Commission has relied on evidence that was preserved only fortuitously.[647] If the record in this case had been marginal, while simultaneously containing evidence that Rambus had destroyed potentially relevant documents, we would have pursued the spoliation inquiry to its conclusion and, if appropriate,

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[646] Accordingly, Complaint Counsel's pending motion for sanctions is denied. Complaint Counsel's Motion for Sanctions Due to Rambus's Spoliation of Documents (Aug. 10, 2005), *available at* http://www.ftc.gov/os/adjpro/d9302/050810 ccmosanctions.pdf.

[647] For example, the only sources of Crisp's JEDEC-related e-mails were a hard drive found in Crisp's attic, *see* CX 5075 at 3-5 (deposition transcript at 296-302) (Crisp 2004 *Infineon* Dep.), and an old Rambus server that Crisp had used to transfer e-mails between his Macintosh and PC office computers. *See* Crisp, Tr. 3572-76, 3588-92; CX 5078 at 14 (trial transcript at 124). Likewise, although Rambus's outside patent counsel, Vincent, destroyed most of his Rambus-related files, he retained certain relevant correspondence in his personal files. *See* CX 5066 (designated GCWF 3448). In addition, records that Rambus failed to produce in the normal course of discovery were retrieved from corrupted back-up files in the subsequent *Hynix* litigation, and the Commission was able to add this evidence to this proceeding's record on appeal. *See* CX 5100-16; *see also supra* Section II.B.

imposed a remedy. The Commission has a broad range of remedies available to address spoliation, ranging from drawing adverse inferences to ordering that a proceeding be decided against the spoliating party. If spoliation were proven in a future case, the Commission would not hesitate to impose warranted sanctions, in keeping with its fundamental interest in preserving the integrity of its administrative proceedings.

VI. CONCLUSION

We find that Rambus engaged in exclusionary conduct that significantly contributed to its acquisition of monopoly power in four related markets. By hiding the potential that Rambus would be able to impose royalty obligations of its own choosing, and by silently using JEDEC to assemble a patent portfolio to cover the SDRAM and DDR SDRAM standards, Rambus's conduct significantly contributed to JEDEC's choice of Rambus's technologies for incorporation in the JEDEC DRAM standards and to JEDEC's failure to secure assurances regarding future royalty rates – which, in turn, significantly contributed to Rambus's acquisition of monopoly power.

Rambus claims that the superiority of its patented technologies was responsible for their inclusion in JEDEC's DRAM standards. These claims are not established by the record. Nor does the record support Rambus's argument that, even after two JEDEC standards were adopted and substantial switching costs had accrued, JEDEC and its participants were not locked into the standards. Rambus now claims that we can and should blind ourselves to the link between its conduct and JEDEC's adoption of the SDRAM and DDR SDRAM standards, as well as to the link between JEDEC's standard-setting process

and Rambus's acquisition of monopoly power. These claims fail, both as a matter of fact and as a matter of law. To hold otherwise would be to allow Rambus to exercise monopoly power gained through exclusionary conduct. We cannot abide that result, given the substantial competitive harm that Rambus's course of deceptive conduct has inflicted.

VII. REMEDY

Complaint Counsel seek an order preventing Rambus from enforcing, against JEDEC-compliant products, (1) any patents that claim priority based on applications filed before Rambus withdrew from JEDEC and (2) any existing licensing agreements.[648] Rambus argues that the Commission lacks authority to impose such a remedy and that the royalty rates set by its existing licenses already satisfy all remedial concerns.[649]

Both parties' arguments regarding remedy have been scant and, for the most part, reflective of opposing extremes.[650] Now that the Commission has found, and determined the scope of, liability, the Commission believes it would exercise its broad remedial powers most responsibly after additional briefing

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[648] CCAB at Attachment 2; CCRB at 95-100.

[649] RB at 128-33.

[650] *See generally* United States v. National Lead Co., 332 U.S. 319 (1947) (rejecting the imposition of compulsory, royalty-free licenses when they were not "necessary in order to enforce effectively the Anti-Trust Act," and finding that "licenses at uniform, reasonable royalties" would be sufficient to accomplish the discontinuance and prevention of the illegal restraints). For discussion of Rambus's existing royalty rates, *see supra* Section IV.C.4.

and, if necessary, oral argument devoted specifically to remedial issues.

The accompanying order establishes a briefing schedule. The parties' written presentations directed by the accompanying order will be confined to remedy; re-argument of issues of liability will not be permitted in those presentations. The Commission is most interested in the parties' views regarding possibilities for establishing reasonable royalty rates for JEDEC-compliant products affected by Rambus's exclusionary conduct. The parties should address, without limitation: (1) means for the Commission to determine, based on the existing record, reasonable royalty rates for licensing all technologies applicable to JEDEC-compliant products and covered by relevant Rambus patents; (2) alternative mechanisms and procedures for determining reasonable royalty rates, such as an independent arbitrator, a special master, or an ALJ; (3) qualitative characteristics descriptive of appropriate relief, against which specific royalty proposals might be evaluated; and (4) appropriate injunctive and other provisions that should be incorporated in the Final Order in this proceeding.

CONCURRING OPINION OF COMMISSIONER JON LEIBOWITZ

DOCKET NO. 9302

IN THE MATTER OF RAMBUS, INC.

I. INTRODUCTION

Rambus's deception of JEDEC and its members injured competition and consumers alike. The company exploited the DRAM standard-setting process for its own anticompetitive ends. JEDEC's members – including Rambus – understood that this information was to be gathered and shared to benefit the industry and its consumers as a whole, yet Rambus effectively transmogrified JEDEC's procompetitive efforts into a tool for monopolization. As detailed in the Commission's Opinion, such conduct meets all the requisite elements of a Section 2 violation.

It would be equally apt, though, to characterize Rambus's conduct as an "unfair method of competition" in violation of Section 5 of the FTC Act. Section 5 was intended from its inception to reach conduct that violates not only the antitrust laws[294] themselves, but also the policies that those laws were intended to promote. At least three of these policies are at issue here. From the FTC's earliest days, deceitful conduct has fallen within Section 5's province for its effects on competition, as well as on consumers.[295]

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[294] 15 U.S.C. § 12 (a) (2006). The antitrust laws include the Sherman Act and the Clayton Act (as modified by the Robinson-Patman Act). The FTC Act is not an antitrust law.

[295] Cal. Dental Ass'n v. F.T.C., 526 U.S. 756, 772 n.9 (1999) ("That false or misleading advertising has an anticompetitive effect, as that term is customarily used, has been long estab-

Innovation – clearly at issue in this case – is indisputably a matter of critical antitrust interest.[296] In addition, joint standard-setting by rivals has long been an "object[] of antitrust scrutiny" for its anticompetitive uses, notwithstanding its great potential also to yield efficiencies.[297] In this case, Rambus's de-

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lished). *Cf.* F.T.C. v. Algoma Lumber Co., 291 U.S. 67, 79-80 (1934) (finding a false advertisement to be unfair competition)."; F.T.C. v. Winsted Hosiery, 258 U.S. 483 (1922) (per Brandeis, J.) (holding that false labeling that misled consumers constituted unfair competition against competitors). *See also* F.T.C. v. Gratz, 253 U.S. 421, 427 (1920) (holding that "unfair methods of competition" do not apply to practices that were "never heretofore regarded as opposed to good morals because characterized by deception, bad faith, fraud, or oppression, or as against public policy because of their dangerous tendency unduly to hinder competition or create monopoly"). Notably, the *Gratz* view of Section 5's scope was later abandoned as *too narrow*. F.T.C. v. R.F. Keppel & Bros., Inc., 291 U.S. 304 (1934).

[296] *See generally* FED. TRADE COMM'N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (Oct. 2003), *available at* http://www.ftc.gov/os/2003/10/innovationsrpt.pdf.

[297] *See, e.g.*, Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 500-01 (1988) (holding that "private standard-setting associations have traditionally been objects of antitrust scrutiny" because of their potential use as a means for anticompetitive horizontal agreements, but that the associations' "potential for procompetitive benefits" has influenced "most lower courts to apply rule-of-reason analysis to product standard- setting by private associations"). *See also* TIMOTHY J. MURIS, BUREAU OF CONSUMER PROT., FED. TRADE COMM'N, STAFF REPORT ON THE STANDARDS AND CERTIFICATION RULE 9 (1983) ("Standard setting can be misused to exclude competitors unreasonably, injuring consumers. The Commission can pursue anticompetitive restraints as unfair methods of competition, using a rule of reason approach, or as unfair acts or practices under the Commission's unfairness protocol, in each case weighing the benefits and costs of the challenged ac-

ceptive conduct distorted joint standard-setting decisions and innovation investments in ways that seriously injured the operations of the competitive market to the detriment of consumers; it thereby transgressed the policies and spirit of the antitrust laws in all three respects. While respondent's behavior before JEDEC might well have been challenged solely as a pure Section 5 violation, Complaint Counsel did not litigate this theory before the administrative law judge. Thus, I write separately to discuss and reemphasize the broad reach and unique role of Section 5.

I also address the scope of Section 5 because some commentators have misperceived the Commission's authority to challenge "unfair methods of competition," incorrectly viewing it as limited, with perhaps a few exceptions, to violations of the Sherman and Clayton Acts.[298] Others are unclear just how far Section 5 can reach beyond the antitrust laws.[299] Regardless of the reasons for these cramped or confused views, a review of Section 5's legislative history,

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tivity.").

[298] *See, e.g.*, Richard A. Posner, *The Federal Trade Commission: A Retrospective*, 72 ANTITRUST L.J. 761, 765-66 (2005) ("It used to be thought that 'unfair methods of competition' swept further than the practices forbidden by the Sherman and Clayton Acts, and you find this point repeated occasionally even today . . . .").

[299] Antitrust Law Special Comm., Am. Bar Ass'n, REPORT ON THE ROLE OF THE FEDERAL TRADE COMMISSION, 58 ANTITRUST L.J. 53, 63-64 n. 11 (1989) (observing that "[a]lthough it is well established that Section 5's ban on 'unfair methods of competition' permits the FTC to proscribe conduct not reached by prevailing interpretations of the Sherman and Clayton Acts, there is a debate about how far Section 5 reaches beyond those Acts.").

statutory language, and Supreme Court interpretations reveals a Congressional purpose that is unambiguous and an Agency mandate that is broader than many realize.

The Commission, in my view, should place greater emphasis on developing the full range of its jurisdiction and making it more clear to the bar, the public, the business community, and potential antitrust malefactors what Section 5 embraces and what it does not. Although the Commission has not left fallow its Section 5 jurisdiction to challenge conduct outside the antitrust laws, neither has the Agency fully exercised or explained it. In discussing Section 5 in the context of Rambus, I hope to encourage the Commission (and its staff) to develop further and employ more fully this critical and unique aspect of our statutory mandate. If we do, benefit will accrue both to consumers and to competition.

II. THE MANDATE UNDERLYING SECTION 5

A. Legislative History

Debates regarding the need for, and nature of, a "federal trade commission" roiled for more than a decade prior to its creation in 1914.[300] These debates involved four of the most brilliant minds of the time – Roosevelt, Taft, Wilson, and Brandeis – and coalesced into a significant issue in the election of 1912.[301] One

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[300] The FTC's predecessor, the Bureau of Corporations, was created in 1903.

[301] Marc Winerman, *The Origins of the FTC: Concentration, Cooperation, Control, and Competition*, 71 ANTITRUST L.J. 1 (2003) (providing the most thorough examination of the FTC's creation and the competing forces and philosophies that gave the agency its ultimate form and powers). *See also* Robert Lande, *Wealth Transfers as the Original and Primary Concern*

of the flashpoint events that led Congress to act was the *Standard Oil* case, in which the Supreme Court in 1911 adopted "rule of reason" analysis for the Sherman Act's prohibition on "restraints of trade."[302] Many within and outside of Congress viewed the Supreme Court's reasonableness test as judicial invention - what some more recently would term "legislat[ing] from the bench"[303] – that threatened both to undermine Congress's aim in passing the Sherman Act and to yield inconsistent applications from court to court.[304]

Congress's bipartisan reaction was to create an administrative agency with antitrust expertise, an enforcement mandate *more expansive than that of the antitrust laws*, and the structure and flexibility to identify, analyze, and challenge new forms of "unfair methods of competition" as they developed.[305] Legislators in the Congressional debates repeatedly expressed these goals. Senator Robinson, for example, indicated that "unfair methods of competition" encompassed practices that constituted "unjust, inequi-

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of Antitrust: The Efficiency Interpretation Challenged, 34 HASTINGS L.J. 65 (1982); Neil Averitt, *The Meaning of 'Unfair Methods of Competition' in Section 5 of the Federal Trade Commission Act*, 21 B.C. L. REV. 229 (1980).

[302] Standard Oil Co. v. U.S., 221 U.S. 1 (1911).

[303] *See, e.g.*, 140 CONG. REC. 10,109 (1994) (statement of Sen. Thurmond during Senate hearing on nomination of Justice Breyer).

[304] *See, e.g.*, 47 CONG. REC. 1,225 (1911) (statement of Sen. Newlands).

[305] Another, related Congressional response, also in 1914, was passage of the Clayton Act, 15 U.S.C. § 12, which, *inter alia*, contained specific provisions regarding discriminatory pricing, tying, stock acquisitions, and interlocking directorates.

table, or dishonest competition."[306] Senator Pomerene and Senator Thomas both stated that the proposed Act would authorize the Commission to determine whether certain forms of business conduct constituted unfair methods of competition, regardless of whether that conduct involved a restraint of trade.[307] Senator Newlands, the Chairman of the Senate Commerce Committee, responded to concerns about this process by explaining that "[y]ou can not [sic] take a body of five men, intelligent men, composed as this body will be of lawyers, economists, publicists, men engaged in industry, who will not be able to determine justly whether the practice is contrary to good morals or not."[308]

Section 5 was not enacted merely to mirror the antitrust laws. Senator Cummins, one of the bill's main proponents, squarely addressed this issue on the Senate floor when he responded to the question, "why, if unfair competition is in restraint of trade, [are we] attempting to add statute to statute and give a further remedy for the violation of the [Sherman Act]?" Senator Cummins replied that the concept of "unfair competition" seeks:

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[306] 51 CONG. REC. 12,153 (1914) (statement of Sen. Robinson).

[307] 51 CONG. REC. 12,161 (1914) (statement of Sen. Pomerene); 51 CONG. REC. 12,197 (1914) (statement of Sen. Thomas). In Senator Cummins's view, the discretion and judgment of the Commission should not even be subject to judicial review. 51 CONG. REC. 12,151 (1914) (statement of Sen. Cummins).

[308] 51 CONG. REC. 12,154 (1914) (statement of Sen. Newlands). Had he made his comment in more recent times, Senator Newlands doubtlessly would have phrased it to apply to a body of five men and women.

> to go further [than "restraints of trade"] and make some things offenses that are not now condemned by the antitrust law. That is the only purpose of Section 5 – to make some things punishable, to prevent some things, that can not [sic] be punished or prevented under the antitrust law.[309]

Echoing this point, he later described Section 5 as new substantive law that would involve the Commission in activities beyond the simple enforcement of antitrust law.[310] Many other legislators similarly expressed their intent and understanding that Section 5 would extend beyond the Sherman Act.[311]

While the Act's legislative history makes its "sweep and flexibility . . . crystal clear,"[312] the plain language

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[309] 51 CONG. REC. 12,454 (1914) (statement of Sen. Cummins). Senator Cummins, an "insurgent" Republican, was a member both of the Commerce Committee, which prepared the Commission bill, and the Judiciary Committee, which prepared the bill that became the Clayton Act. He authored the "Cummins Report," which provided critical support for the Commission bill and helped influence its ultimate content.

[310] 51 CONG. REC. 12,613 (1914) (statement of Sen. Cummins).

[311] *See, e.g.*, 51 CONG. REC. 14 333 1914 statement of Sen. Kenyon, remarking that the proposed federal trade commission "can take hold of matters that not in themselves are sufficient to amount to a monopoly or to amount to restrain [sic] of trade"); 51 CONG. REC. 14,329 (1914) (statement of Sen. Nelson, stating that the FTC Act "can be used in a lot of cases where there is no trust or monopoly"); 51 CONG. REC. 12,135 (1914) (statement of Sen. Newlands, observing that although "[a]ll agree that while the Sherman law is the foundation stone of our policy on [appropriate business conduct], additional legislation is necessary").

[312] F.T.C. v. Sperry & Hutchinson Co., 405 U.S. 233, 241 (1972). *See also* F.T.C. v. Cement Inst., 333 U.S. 683, 693 (1948)

of the statute further bolsters this conclusion. If Congress had wanted Section 5's reach to be merely coterminous with that of the Sherman Act, it easily could have written the statute accordingly. There would have been no logic in doing so, of course, since the Sherman Act already existed.

In drafting Section 5, Congress did not mimic the Sherman Act or try to enumerate a list of unfair practices. Rather, the Senate Report explains, Congress left it to the Commission "to determine what practices were unfair" because "there were too many unfair practices to define, and after writing 20 of them into law it would be quite possible to invent others."[313] To ensure there would be no misunderstanding, Congress carefully crafted the term "unfair methods of competition" to distinguish it from the narrower common-law concept of "unfair competition."[314] Thus, Congress made clear its intent, both to those who would later enforce Section 5 and those who would be subject to its strictures, that this provi-

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("All of the committee reports and the statements of those in charge of the Trade Commission Act reveal an abiding purpose to vest both the Commission and the courts with adequate powers to hit at every trade practice, then existing or thereafter contrived, which restrained competition or might lead to such restraint if not stopped in its incipient stages."); *Id.* at 693 n.6 (offering many citations to the Congressional Record).

[313] S. Rep. No. 63-597, at 13 (1914) (internal quote omitted).

[314] H.R. Rep. No. 63-1142, at 19 (1914) (Conf. Rep.) ("There is no limit to human inventiveness in this field. . . . If Congress were to adopt the method of definition, it would undertake an endless task."); *Keppel*, 291 U.S. at 310-12, n.2 (stating that the Conference Committee substituted the phrase "unfair methods of competition" for "unfair competition" to ensure that the scope of the FTC Act would not be "restricted to those forms of unfair competition condemned by the common law.").

sion was not confined to the collection of violations then-recognized in antitrust or common law, but rather conferred a broader and more adaptable authority on the Commission.[315] Now, as more fully developed by the courts and Commission, Section 5 permits the FTC to challenge conduct outside the bounds of the antitrust law that (a) violates the policies that underlie the antitrust laws or (b) constitutes incipient violations of those laws.

B. Supreme Court Interpretations

The FTC's statutory mandate comes not just from the legislature of almost a century ago. For more than 70 years, an unbroken line of Supreme Court opinions has interpreted Section 5 as encompassing a broader array of behavior than the antitrust laws.[316]

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[315] *See Keppel*, 291 U.S. at 310 ("It would not have been a difficult feat of draftsmanship to have restricted the operation of the Trade Commission Act to those methods of competition in interstate commerce which are forbidden at common law or which are likely to grow into violations of the Sherman Act, if that had been the purpose of the legislation.").

[316] *See Sperry & Hutchinson*, 405 U.S. at 244 (commenting that, after *Keppel*, "unfair competitive practices were not limited to those likely to have anticompetitive consequences after the manner of the antitrust laws; nor were unfair practices in commerce confined to purely competitive behavior."). Prior to the 1934 *Keppel* case, Supreme Court opinions tended to articulate a narrower view of Section 5's range. *See, e.g.*, F.T.C. v. Raladam Co., 283 U.S. 643 (1931); Gratz, 253 U.S. 421. Notably, however, even *Gratz*, which was authored only six years after the FTC's creation, emphasized Section 5's use to redress conduct such as that at issue in the present case, namely, "deception, bad faith, fraud, or oppression, or [practices that are] against public policy because of their dangerous tendency unduly to hinder competition or create monopoly." *Id.* at 427.

Most recently, the Court in *Indiana Federation of Dentists* (*"IFD "*) observed that the standard for "unfairness" under the FTC Act is, "by necessity, an elusive one, encompassing not only practices that violate the Sherman Act and the other antitrust laws, but also practices that the Commission determines are against public policy for other reasons."[317]

The Court in *IFD* relied on *Sperry & Hutchinson*, the Court's most recent, substantive analysis of Section 5's history and breadth. In *Sperry*, the Court answered two critical questions:

> First, does § 5 empower the Commission to define and proscribe an unfair competitive practice, even though the practice does not infringe either the letter or the spirit of the antitrust laws? Second, does § 5 empower the Commission to proscribe practices as unfair or deceptive in their effect upon consumers regardless of their nature or quality as competitive practices or their effect on competition? We think the statute, its legislative history, and prior cases compel an affirmative answer to both questions.[318]

Drawing on its review of Section 5's legislative history and other authority, the Court concluded that the Commission:

> does not arrogate excessive power to itself if, in measuring a practice against the elusive, but congressionally mandated standard of fairness, it, like a court of equity, *considers public values*

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[317] F.T.C. v. Ind. Fed'n of Dentists, 476 U.S. 447, 454 (1986) (citations omitted).

[318] *Sperry & Hutchinson*, 405 U.S. at 239.

> *beyond simply those enshrined in the letter or encompassed in the spirit of the antitrust laws.*[319]

Supreme Court opinions prior to *IFD* expressed similar views. In *F.T.C. v. Brown Shoe Company*, the Court stated:

> [t]his broad power of the Commission is particularly *well established with regard to trade practices which conflict with the basic policies of the Sherman and Clayton Acts* even though such practices may not actually violate these laws . . . .[320]

and further quoted *F. T. C. v. Motion Picture Advertising Service Company* for the proposition:

> [i]t is . . . clear that the Federal Trade Commission Act was designed to supplement and bolster the Sherman Act and the Clayton Act . . . *to stop in their incipiency acts and practices which, when full blown, would violate those Acts* . . .
>
> as well as to condemn as "unfair methods of competition" existing violations of them.[321]

I know of no Supreme Court case in the past 70 years that disagrees with these goals, contracts this scope, or disputes the flexibility and elasticity inherent in Section 5.[322]

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[319] *Id.* at 244 (emphasis added).

[320] F.T.C. v. Brown Shoe Co., 384 U.S. 316, 321 (1966) (emphasis added).

[321] *Id.* at 322 (quoting F.T.C. v. Motion Picture Adv. Serv. Co., 344 U.S. 392, 394-95 (1953) (emphasis added)). *See also* F.T.C. v. Texaco, 393 U.S. 223, 225-26 (1968).

[322] *See, e.g.*, Atl. Ref. Co. v. F.T.C., 381 U.S. 357, 369 (1965) ("As our cases hold, all that is necessary in § 5 proceedings to

C. Important Appellate Cases

In the early 1980s, courts of appeals rebuffed FTC efforts to apply Section 5 in three frequently-cited cases: *Official Airline Guides*, *Boise Cascade*, and *Ethyl*.[323] Each of these cases was decided before *IFD*, with its reliance on *Sperry & Hutchinson's* reiteration of Section 5's breadth. These appellate opinions support the propositions that Section 5 does not condemn pure conscious parallelism (*i.e.*, unaccompanied by any "plus factors") or conduct justified by an independent, legitimate business purpose. The decision in each, however, turns primarily on an evidentiary failure to demonstrate that the challenged conduct

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find a violation is to discover conduct that 'runs counter to the public policy declared in the' Act."); *Cement Inst.*, 333 at 694 ("[A]lthough all conduct violative of the Sherman Act may likewise come within the unfair trade practice prohibitions of the Trade Commission Act, the converse is not necessarily true. It has long been recognized that there are many unfair methods of competition that do not assume the proportions of Sherman Act violations."); Fashion Originators' Guild of Am. v. F.T.C., 312 U.S. 457, 466 (1941) ("Nor is it determinative in considering the policy of the Sherman Act that petitioners may not yet have achieved a complete monopoly. For 'it is sufficient if it really tends to that end and to deprive the public of the advantages which flow from free competition.' . . . [I]t was the object of the Federal Trade Commission Act to reach not merely in their fruition but also in their incipiency combinations which could lead to these and other trade restraints and practices deemed undesirable."); *Keppel*, 291 U.S. at 312 n.2 (concluding from a detailed review of the legislative history that Congress wanted "unfair methods of competition" to confer a broad, flexible mandate that would exceed the "forms of unfair competition condemned by the common law").

[323] Official Airline Guides, Inc. v. F.T.C., 630 F.2d 920 (2d Cir. 1980); Boise Cascade Corp. v. F.T.C., 637 F.2d 573 (9th Cir. 1980); and E.I. du Pont de Nemours & Co. v. F.T.C., 729 F.2d 128 (2d Cir. 1984) [hereinafter *Ethyl*].

constituted an effort to acquire market power, tacitly collude, or manipulate price for anticompetitive purposes. *None* of these cases significantly constrains the FTC's authority to apply Section 5 to violations of the policies that underlie the antitrust statutes or that cause actual or incipient antitrust injury.

In *Official Airline Guides ("OAG")*, the FTC challenged the refusal by a monopolist/publisher of airline schedules to include in its compendium schedules of commuter airlines. This refusal to deal was discriminatory, unjustified, and injurious to commuter airlines in their competition with certificated airlines. The monopolist, however, did not act coercively, did not compete in the commuter airlines' market, where the antitrust injury occurred, and did not seek or have any prospect of gaining power in that market. Although the court acknowledged that FTC determinations as to what practices constitute an "unfair method of competition" deserve great weight,[324] it declined to uphold the Commission's order. Rather, it opted to characterize the respondent's action as a unilateral refusal to deal protected by *United States v. Colgate & Company*.[325] In explaining its decision, the court expressed concern that declaring such conduct unlawful would give the Commission too much latitude to substitute its own judgment for a respondent's independent business decisions that were taken without any anticompetitive purpose or prospect. In essence, although the challenged conduct was discriminatory and harmful, it did not violate the policies underlying the antitrust laws. The

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[324] *Official Airline Guides*, 630 F.3d at 927 (citing *Cement Inst.*, 333 U.S. at 692-93, and *Atl. Ref.*, 381 U.S. at 367-68).

[325] U.S. v. Colgate & Co., 250 U.S. 300 (1919).

opinion does not discuss Section 5's jurisdictional breadth, and the facts of the case are so unusual that the case has little import for that legal issue.[326]

Boise Cascade involved the use of an industry-wide delivered pricing system. Industry members effected this system by including an artificial freight factor in the price charged to customers. The Commission contended that this practice tended to stabilize prices and therefore violated the Sherman and FTC Acts. The Ninth Circuit disagreed, however, concluding that the use of delivered pricing in this instance was a natural and independent, albeit consciously parallel, response to customer preferences. The court found no need to opine whether consciously parallel conduct, without more, could ever violate Section 5; it declined, however, to hold such behavior illegal *per se* where, as here, persuasive evidence of an anticompetitive effect was lacking. Although the court acknowledged "the unique features of the FTCA,"[327] it held that delivered pricing warranted the same legal assessment under both the FTC and Sherman Acts, since the relevant case law had been well-developed in both court and Commission litigation, as well as

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[326] In In re General Motors, 99 F.T.C. 464, 580 n.45 (1982), the Commission declared its position that the Second Circuit's decision was incorrect and that "unless it is repudiated by the Supreme Court we hold to our interpretation of the case law on arbitrary refusals to deal by monopolists. . . ." Nonetheless, a 2003 Commission letter observed that "the Commission has not issued a decision [since *OAG*] holding that a monopolist violated the FTC Act by using unfair methods of competition that affected customers in an adjacent market in which the monopolist did not operate." Letter from Fed. Trade Comm'n, to the U.S. Dep't of Transp. (Jun. 6, 2003) (on file with FTC Office of General Counsel).

[327] *Boise Cascade*, 637 F.2d at 581.

through prior Commission statements and practices on the issue. The court concluded that this history had resulted in a requirement that "the Commission must find either collusion or actual effect on competition to make out a §5 violation for use of delivered pricing."[328] The court was clear, however, to confine this requirement to situations involving delivered pricing; consequently, it does not materially affect the well-recognized scope of Section 5.

In *Ethyl* – perhaps the most misunderstood and frequently mis-cited case regarding the scope of Section 5 – the Commission challenged four producers of gasoline anti-knock compounds for their use of delivered pricing, most-favored nation clauses, 30-day ad-

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[328] *Id.* at 582. Much of this history is based on a series of delivered and base-point pricing cases that reached their doctrinal limits in *Cement Institute*. 333 U.S. at 721 n.19 (holding that "[w]hile we hold that the Commission's findings of combination were supported by evidence, that does not mean that the existence of a 'combination' is an indispensable ingredient of an 'unfair method of competition' under the Trade Commission Act."). *See also* Triangle Conduit & Cable Co. v. F.T.C., 168 F.2d 175 (7th Cir. 1948). Shortly thereafter, the Commission declared that the use of base point pricing could violate Section 5, even when not adopted or implemented as part of a combination or conspiracy. INTERIM REPORT ON STUDY OF FEDERAL TRADE COMMISSION PRICING POLICIES, S. Doc. No. 27, 81st Cong., 1st Sess. 41 (1949) [hereinafter "Interim Report"]. In Congress, however, legislation was introduced to reverse this position, and FTC Commissioners were subjected to "demanding" questioning in Senate Committee hearings. The legislation was abandoned only "after a majority of the commissioners recanted and testified that Section 5 prohibits only conspiracies to adopt base point pricing." Mary Azcuenaga, FTC Comm'r, *Shimmers in the Penumbra of Section 5 and Other News*, Address Before the 13th Annual Antitrust and Trade Regulation Seminar XX (Jul. 9, 1992) at 9-11 (on file with FTC Office of General Counsel); S. Doc. No. 27 at 59-63.

vance notice to customers of price changes, and announcement of price increases in the press. The producers did not act collusively in adopting and employing these practices; rather, they followed industry tradition and responded to customer demand. The FTC concluded that the practices nonetheless violated Section 5 because they constituted interdependent conduct that substantially reduced competition in the market. The appellate court disagreed, however, because it did not find substantial evidence that the challenged practices led to an adverse competitive impact.[329] Thus, this case, like *Boise Cascade*, was not decided on grounds of statutory interpretation but evidentiary sufficiency.[330]

Despite the outcome, the court engaged in a significant analysis of Section 5 and reconfirmed that it extends to conduct that does not fall within the antitrust laws. In particular, the court noted that "Congress' aim was to protect society against oppressive anticompetitive conduct and thus assure that the conduct prohibited by the Sherman and Clayton Acts would be supplemented as necessary and any interstices filled."[331] Subsequently the court elaborated that:

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[329] *Ethyl*, 729 F.2d at 140-41. The court noted that the FTC's majority opinion observed that non- collusive facilitating practices violate Section 5 only where the evidence demonstrates that they substantially lessen competition and reveal a "clear nexus" between the practices and the competitive harm. The court found such evidence lacking in this case. *Id.*

[330] For a detailed discussion of the Commission analysis in Ethyl regarding facilitating practices, *see* Donald S. Clark, *Price-Fixing Without Collusion: An Antitrust Analysis of Facilitating Practices After Ethyl Corp.*, 1983 WISC. L. REV. 887 (1983).

[331] *Ethyl*, 729 F.2d at 136 (quoting Report of the Conference

> [a]lthough the Commission may under § 5 enforce the antitrust laws, including the Sherman and Clayton Acts, it is not confined to their letter. It may bar incipient violations of those statutes, and conduct which, although not a violation of the letter of the antitrust laws, is close to a violation or is contrary to their spirit. In prosecuting violations of the spirit of the antitrust laws, the Commission has, with one or two exceptions, confined itself to attacking collusive, predatory, restrictive or deceitful conduct that substantially lessens competition.[332]

Section 5's intentionally unparticularized phrase, "unfair methods of competition" is not, therefore, an all-encompassing, unfocused warrant as some would claim. Rather, it is a flexible and powerful Congressional mandate to protect competition from unreasonable restraints, whether long-since recognized or newly discovered, that violate the antitrust laws, constitute incipient violations of those laws, or contravene those laws' fundamental policies.[333]

Committee, H.R.Rep. No. 1142, 63d Cong., 2d Sess. 19 (1914)).

[332] *Id.* at 136-37 (citations and footnote omitted). *See also* F.T.C. v. Abbott Lab., 853 F.Supp. 526 (D.D.C. 1994) (relying on *Ethyl* and *Sperry & Hutchinson*).

[333] This same period, 1980-1984, also yielded significant FTC efforts to rein in the use of Section 5. The most important of these is In re General Foods Co., 103 F.T.C. 204, 364-66 (1984). In this case the Commission rejected application of Section 5 to an alleged attempt to monopolize where the evidence did not reveal a dangerous probability of success, an element that had long been required under Section 2 of the Sherman Act. In the Commission's view, the concept of an incipient attempt to monopolize was simply beyond parsing. Moreover:

III. LIMITING ATTRIBUTES OF SECTION 5

Congress had good reasons for leaving Section 5's metes and bounds unspecified. Any effort in the name of "guidance" to provide a detailed plat defining its coverage would undermine Congress's clear intent to create a statute with sufficient scope, elasticity, and adaptability to accomplish its purpose. Thus, the influential treatise, Antitrust Law, observes, that:

> [i]t is now commonly said that Federal Trade Commission § 5 is not confined by the prohibitions of the Sherman Act or the Clayton Act. Indeed, § 5 is not confined by antitrust concepts at all. It allows the Commission to condemn conduct that is "unfair" in senses "beyond simply those enshrined in the letter or encompassed in the spirit of the antitrust laws." Or as the Supreme Court more recently put it, the "standard of 'unfairness' under the FTC Act is, by necessity, an elusive one, encompassing not only practices that

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> [w]hile Section 5 may empower the Commission to pursue those activities which offend the "basic policies" of the antitrust laws, we do not believe that power should be used to reshape those policies when they have been clearly expressed and circumscribed.

Id. at 352. The Commission expressly limited its holding in this regard to the dangerous probability issue and declined to comment whether Section 5 required the same measure of intent as did Section 2 of the Sherman Act. Other significant Commission actions from this period that bear on Section 5 jurisdiction regarding competition policy enforcement include: In re Kellogg Co., 99 F.T.C. 8 (1982) (summarily dismissing the appeal of an initial decision rejecting allegations that non-collusive efforts to maintain shared monopoly control of the ready-to-eat cereal market violated Section 5); and In re Exxon Co., 98 F.T.C. 453 (1981) (terminating an investigation into shared monopoly in the petroleum industry).

> violate the Sherman Act and the other antitrust laws but also practices that the Commission determines are against public policy for other reasons."
>
> We have no general quarrel with these holdings; our own concern is limited to § 5 holdings that follow "the letter or . . . spirit of the antitrust laws.[334]

My concerns here are also confined to matters implicating "the letter or spirit" of the antitrust laws. Section 5's "standard of unfairness" in this regard may yet strike some as "elusive," but it is far from unknowable or unbounded. Congress's mandate is that Section 5 should supplement and bolster the antitrust laws by challenging conduct that not only violates the antitrust laws but that also falls within the "penumbra"[335] of those statutes. Two critical attributes of Section 5 – the limited consequences of a Section 5 violation, and the inherent relationship between Section 5's reach and the scope of the antitrust

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[334] PHILLIP AREEDA, HERBERT HOVENKAMP & ROGER BLAIR, II ANTITRUST LAW 302h, p.21 (2d ed.) (Aspen Law and Business, 2000) (footnotes omitted).

[335] *Sperry & Hutchinson*, 405 U.S. at 244 n.5 (quoting Unfair or Deceptive Advertising and Labeling of Cigarettes in Relation to the Health Hazards of Smoking, 29 Fed. Reg. 8324, 8355 (Jul. 2, 1964) (codified at 15 C.F.R. pt. 408)). *See also* Chuck's Feed & Seed Co., Inc. v. Ralston Purina Co., 810 F.2d 1289, 1292-93 (4th Cir. 1987); Mary Azcuenaga, FTC Comm'r, *FTC Enforcement: An Idiosyncratic Journey*, Address Before the 15th Annual Antitrust and Trade Regulation Seminar 5 (Jul. 7, 1994) (on file with FTC Office of General Counsel); Mary Azcuenaga, *Shimmers in the Penumbra of Section 5 and Other News*, *supra* note 35; William E. Kovacic, *The Federal Trade Commission and Congressional Oversight of Antitrust Enforcement*, 17 TULSA L.J. 587, 625-627 (1982).

laws – help ensure that respondents find enforcement efforts under this mandate to be neither punitive nor overreaching.

A. The Consequences of a Section 5 Violation Are More Limited than Those Resulting from a Violation of the Antitrust Laws

Section 5 violations involving conduct outside the antitrust statutes entail far more limited consequences than do violations of the Sherman or Clayton Acts. The FTC nearly always brings such cases as administrative litigation, and violations generally result only in cease-and-desist orders designed to prevent future violations and, on occasion, injunctive measures to help preserve or restore conditions for vigorous competition in the market.[336] In addition, although the Commission may seek disgorgement or restitution in competition matters, it must do so from a court. Moreover, the Agency's policy is to request equitable monetary relief in such matters only where the violation is relatively clear.[337]

The FTC Act contains no provisions for private enforcement. A Commission action brought under Section 5 has little value in subsequent "follow-on" treble-damage litigation,[338] and proof of Section 5 vio-

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[336] *But see e.g.*, In re Xerox, 86 F.T.C. 364 (1975) (consent order compelling limited royalty free licensing of patents for dry paper copier technology).

[337] FED. TRADE COMM'N, POLICY STATEMENT ON MONETARY EQUITABLE REMEDIES IN COMPETITION CASES (2003), *available at* http://www.ftc.gov/ow/2003/07/disgorgementfrn.htm. *See also* F.T.C. v. Mylan Lab., Inc., 62 F. Supp. 2d 25, 36-37 (D.D.C. 1999) (mem.), *aff'd* in pertinent part, 99 F. Supp. 2d 1, 4-5 (D.D.C. 1999).

[338] *See* 15 U.S.C. § 16(a) (1984). "[I]n any action or proceeding brought under the antitrust laws, collateral estoppel effect shall

lations, standing alone, provide no basis for seeking criminal penalties under the Sherman Act or comparable state provisions.

Because of these relatively mild consequences, Section 5 can fairly extend more broadly than the antitrust laws. This characteristic makes Section 5 especially well designed to apply in circumstances where exposing the respondent to treble damage jeopardy might be unfair or inappropriate, even though the conduct itself may warrant prohibition. Such circumstances might arise in situations involving unseasoned legal or economic theories, innovative business strategies, new or complex markets, or a substantially altered regulatory context.

The FTC Act also provides a right of review in the courts of appeals. Respondents are protected from both unfairness and surprise, especially because the review becomes increasingly searching as the violation becomes more novel. As the Second Circuit declared:

> As the Commission moves away from attacking conduct that is either a violation of the antitrust laws or collusive, coercive, predatory, restrictive or deceitful, and seeks to break new ground by enjoining otherwise legitimate practices, the closer must be our scrutiny upon judicial review.[339]

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not be given to any finding made by the Federal Trade Commission under the antitrust laws or under section 45 [i.e., Section 5]." *See also* Pool Water Prods. v. Olin Corp., 258 F.3d 1024, 1030 (9th Cir. 2001).

[339] *Ethyl*, 729 F.2d at 137.

Although courts sometimes have overturned Commission determinations or remedies – typically on grounds that the evidence does not establish the offense or the order is broader than necessary – appellate courts have almost always reaffirmed the breadth of the FTC's Section 5 jurisdiction.[340]

Finally, the Agency does not enforce Section 5 in a vacuum. Congress also plays an active role, especially in oversight regarding the Commission's authority and statutory interpretations. FTC officials frequently appear before Congressional committees or meet with Congressional staff to describe or defend its policies or practices. Put differently, there are no secrets as to what the Commission is doing or what Congress wants us to do; insufficient, excessive, or misdirected zeal commonly invites scrutiny and correction.[341]

For example, Congressional reaction to the *Cement Institute* and *Triangle Conduit* decisions, as well as to the Commission's declaration that base point pricing could violate Section 5 even when not part of a conspiracy, induced a majority of the commissioners to reverse their position on this issue.[342] It was also Congressional uncertainty regarding the scope of the Commission's Section 5 authority to challenge "unfair acts or practices" that led the Commission to issue a

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[340] *See, e.g., id.* at 136-137.

[341] *See* Kovacic, 17 TULSA L.J. 587 (1982).

[342] *See Boise Cascade*, 637 F.2d at 582; *see also Cement Inst.*, 333 U.S. at 721 n.19; Kovacic, 17 TULSA L.J. at 625-27. *See generally Triangle Conduit*, 168 F.2d at 176; Interim Report, S. Doc. No. 27; Azcuenaga, *Shimmers in the Penumbra of Section 5 and Other News*, *supra* note 35, at 9-11.

"consumer unfairness statement" in 1980.[343] Then, in 1994, Congress went further and codified this statement, in substance, as Section 5(n) of the FTC Act.[344]

Agency officials have regularly incorporated the lessons of appellate and Congressional review into FTC practice, as they should. The Commission has long since put to rest the issues at the center of its most controversial Section 5 matters. It has not, for example, held unlawful the unilateral adoption or use of delivered or base point pricing since the Second Circuit issued its opinion in *Ethyl* 22 years ago. Nor, since that time, has the FTC condemned consciously parallel pricing in the absence of evidence of "oppressiveness" or some "plus factor" suggesting overt or tacit collusion. The Commission also terminated its two controversial shared monopoly matters.[345] This

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[343] Commission Statement of Policy on the Scope of the Consumer Unfairness Jurisdiction, *included in* Letter from Chairman Pertschuk and Commissioners Dixon, Clanton, Pitofsky and Bailey to the Honorable Wendell H. Ford and the Honorable John C. Danforth (Dec. 1, 1980) (available as appendix to *Int'l Harvester Co.*, 104 F.T.C. 949, 1071 (1984)). This statement was based, in significant part, on Unfair or Deceptive Advertising and Labeling of Cigarettes in Relation to the Health Hazards of Smoking, 29 Fed. Reg. 8324, 8355 (Jul. 2, 1964) (codified at 15 C.F.R. pt. 408), as quoted in *Sperry & Hutchinson*, 405 U.S. at 244 n.5. The Commission issued a companion policy statement regarding "deception" in 1983. Policy Statement on Deception, contained in Commission letter on deception to the Honorable John D. Dingell, Chairman, Subcommittee on Oversight and Investigations, Committee on Energy & Commerce, Oct. 14, 1983, appended to In re Cliffdale Assoc's., 103 F.T.C. 110, 174 (1984).

[344] 15 U.S.C. § 45(n) (2006).

[345] *In re Kellogg Co.*, 99 F.T.C. at 269 (summarily dismissing further appeal); *In re Exxon Co.*, 98 F.T.C. at 461 (dismissing the complaint without prejudice).

history gives me confidence that the FTC will be equally responsive in the future, even if we employ Section 5 more expansively, as we should.

B. Section 5's Scope Is Hinged to That of the Antitrust Laws

As noted previously, when using Section 5 to enforce competition policy, the Commission and courts have largely confined Section 5's reach beyond the antitrust laws to incipient violations of those laws, and violations of those laws' underlying purposes. Because each of these categories finds its touchstone in the antitrust laws themselves, the application of Section 5 is necessarily hinged to the goals, interpretations, and analysis of conduct pursuant to those laws. These sources influence both the content and constraints for "unfair methods of competition," just as they provide both sense and substance for the Sherman Act's equally nonspecific phrase, "restraint of trade."

The economic principles and analysis that guide application of the antitrust laws also guides competition policy enforcement under Section 5, notwithstanding the statutory differences. As the antitrust laws expand, shift, or contract, so too does Section 5 adjust and adapt. For example, antitrust analysis has lessened its concern with firm size and market concentration in recent decades and focused more on consumer welfare, innovation, and efficiency. Section 5 jurisprudence has traveled the same path, sometimes leading and sometimes learning. In my view, despite the important differences in breadth and effects, competition policy enforcement under Section 5 appears on balance to be as wise and well-reasoned – no more and no less – as under the antitrust laws.

Section 5's connection with the antitrust laws has led the Agency to rely on antitrust jurisprudence – the cases, principles, and associated economic analysis – as its most significant source of guidance. The Supreme Court articulated the nature of this reliance more than 40 years ago in *Atlantic Refining Company*, when it observed that:

> [i]t has long been recognized that there are many unfair methods of competition that do not assume the proportions of antitrust violations. *Federal Trade Comm'n v. Motion Picture Advertising Service Co.*, 344 U.S. 392, 394 (1953). When conduct does bear the [central competitive] characteristics of recognized antitrust violations it becomes suspect, and the Commission may properly look to cases applying those laws for guidance.[346]

Or, as the Fourth Circuit expressed more recently:

> In the area of anticompetitive practices, the FTC Act functions as a kind of penumbra around the federal antitrust statutes. An anticompetitive practice need not violate the Sherman Act or the Clayton Act in order to violate the FTC Act. However, the scope of the FTC is nonetheless linked to the antitrust laws. . . . The federal [sic] Trade Commission itself looks to antitrust principles in deciding whether § 5 of the FTC Act has been violated.[347]

Section 5 does not replicate the antitrust laws; the relationship between the provisions is better described as complementary rather than as congruent.

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[346] *Atl. Ref.*, 381 U.S. at 369-70.

[347] *Chuck's Feed*, 810 F.2d at 1292-93 (citations omitted).

In many instances, Section's 5's unique coupling of broad scope with modest consequences may prove to be the most apt enforcement tool. The critical connection between Section 5 and antitrust law and analysis, however, helps ensure that Section 5 remains in harmony with the laws it was designed to bolster and support.

IV. THE ELEMENTS OF A SECTION 5 VIOLATION

If we are to use Section 5 to enforce competition policy in a manner consistent with the intent of its framers, I suggest that there should be two requisite elements for a violation. The first is that the respondent must have engaged in identifiable, culpable conduct. The second is evidence of actual or incipient injury to competition.

Conduct. The conduct aspect of this test ensures that the respondent recognizes – or should have recognized – in advance that its conduct was inappropriate. This requirement is met where the respondent engages in actions that are "collusive, coercive, predatory, restrictive, or deceitful,"[348] or otherwise oppressive, and does so without a justification grounded in its legitimate, independent self-interest.[349] Unlike Section 2 of the Sherman Act, which requires proof of specific intent to prove the offense of attempted monopolization,[350] stand-alone applications of Section 5

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[348] *Ethyl*, 729 F.2d at 137.

[349] *See generally Boise Cascade*, 637 F.2d at 573 (finding independent, legitimate reasons for *Boise Cascade's* use of a delivered pricing system).

[350] In contrast, Section 2 does not require a showing of specific intent to prove unlawful monopolization; for this offense, proof of general intent to engage in the challenged anticompetitive

do not require that element to establish an unfair method of competition. Nonetheless, firms are almost always aware of, and intend, the anticompetitive implications of the types of conduct that would be sufficient for a Section 5 violation. Significantly, although "unfair methods of competition" is not limited to the categories of conduct noted above, Rambus's conduct in this matter could easily have been characterized as falling within several of them.[351]

Injury. Section 5 does not require proof of an actual injury to competition. Rather, established precedent holds that:

> a showing of an actual anticompetitive effect is unnecessary to prove a violation of Section 5 because that section was designed to stop [in] their incipiency acts and practices that could lead to violations of the Sherman or Clayton Acts.[352]

For conduct within the penumbra of the antitrust laws, it is sufficient if the competitive injury is only suspected or embryonic. While conduct violating Section 5 must bear a realistic potential for causing

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conduct will suffice. U.S. v. Grinnell Corp., 384 U.S. 563, 570-71 (1966); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.3d 263 274 (2d Cir. 1979).

[351] Significant information regarding the Commission's prosecutorial policies is available not only through the Commission's cases, but also its consent agreements and the testimony, speeches, and public communications of FTC officials.

[352] In re Coca Cola Co., 117 F.T.C. 795, 970 n.25 (1994) (citing *Sperry & Hutchinson*, 405 U.S. at 244, and In re Dean Foods Co., 70 F.T.C. 1146, 1289-90). The FTC also expressly "disagree[d] with respondent's legal premise" that it must demonstrate "an anticompetitive purpose or effect to find a violation of Section 5 where there is no violation of the Clayton or Sherman Acts." *Id.* at 915.

competitive harm, more manifest injury should not be required.

Other Section 5 standards. Other formulations of Section 5's requirements are worded differently, yet they are strikingly similar in substance. For example, the Second Circuit stated in *Ethyl* that:

> [i]n our view, before business conduct in an oligopolistic industry may be labeled "unfair" within the meaning of § 5 a minimum standard demands that, absent a tacit agreement, at least some indicia of oppressiveness must exist such as (1) evidence of anticompetitive intent or purpose on the part of the producer charged, or (2) the absence of an independent legitimate business reason for its conduct. If, for instance, a seller's conduct, even absent identical behavior on the part of its competitors, is contrary to its independent self-interest, that circumstance would indicate that the business practice is "unfair" within the meaning of § 5. In short, in the absence of proof of a violation of the antitrust laws or evidence of collusive, coercive, predatory, or exclusionary conduct, business practices are not "unfair" in violation of § 5 unless those practices either have an anticompetitive purpose or cannot be supported by an independent legitimate reason.[353]

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[353] *Ethyl*, 729 F.2d at 139-40. *See also Abbott Lab.*, 853 F. Supp. at 536 (quoting, with apparent approval, the footnoted passage from *Ethyl*). The holding in *Boise Cascade*, 637 F.2d at 577, is not inconsistent with the quoted view. *Boise Cascade's* holding that the FTC must demonstrate that the parallel pricing system helped to fix or rigidify market prices if proof of overt collusion is lacking merely reflects the court's view that a Section 5 challenge to non-collusive parallel pricing requires evi-

In essence, the Second Circuit held that a Section 5 cause of action may be predicated on: (a) evidence of tacit agreement, or collusive, coercive, predatory, or exclusionary conduct;[354] *or* (b) evidence of an anticompetitive intent or purpose; *or* (c) lack of an independent, legitimate reason for the conduct. Any of these characteristics will suffice as a predicate. Although *Ethyl* does not expressly require actual or incipient injury to competition, each of the three indicia mentioned above raises the prospect that the challenged conduct will harm competition.

Elaborating in a footnote, the court observed that "[t]he requirement [of oppressiveness] is comparable to the principle that there must be a 'plus factor' before conscious parallelism may be found to be conspiratorial in violation of the Sherman Act."[355] As examples, the court suggested that this "plus factor" requirement could be satisfied by conduct that "is contrary to the defendants' independent self-interest," that reflects a "strong motive on a defendant['s] part to enter an alleged conspiracy," or that may result in the "artificial standardization of products."[356]

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dence suggesting that the conduct injured competition.

[354] "Restrictive" and "deceitful" conduct probably also belong in this listing as well, since the court included them when noting the categories of conduct ("collusive, predatory, restrictive, and deceitful") to which the Commission has usually confined its Section 5 efforts, and the types of conduct ("collusive, coercive, predatory, restrictive, or deceitful") beyond which, efforts to apply Section 5 tend to be more novel and therefore to warrant more searching scrutiny on appellate review. *Ethyl*, 729 F.2d at 136-137.

[355] *Id.* at 140 n.10.

[356] *Id.* (citations omitted).

The appellate court in *Ethyl* was discussing conduct in oligopolistic markets. Nonetheless, factors such as the ones mentioned – the list is not exhaustive – can help flag "unfairness" in other situations as well. Conduct contrary to a firm's legitimate, independent self-interest has frequently been a hallmark of predatory or exclusionary conduct by a dominant firm.[357] The presence of "oppressiveness" or an "anticompetitive intent or purpose," may help distinguish anticompetitive from vigorously competitive conduct.[358] Conduct that leads to the artificial standardization of products – often due to misuse of the standard-setting process – may serve to deter entry, exploit rivals, secure market power, or preserve dominance.[359]

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[357] Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209 (1993) (observing that predatory pricing is unlikely, because it is contrary to a firm's *independent* self interest except when it has the ability to recoup its investment in the strategy); James Hurwitz & William E. Kovacic, *Judicial Standards of Predation: The Emerging Trends*, 35 VAND. L.REV. 63 (1982) (examining theories of predatory pricing and circumstances when pricing below various measures of cost will be contrary to a firm's legitimate self-interest and thus warrant legal condemnation).

[358] In *Official Airlines Guide*, the court was swayed by the appellant's apparent lack of an anticompetitive motive or purpose for its refusal to deal, since OAG did not compete in the market where its conduct had its anticompetitive impact.

[359] *See, e.g., Allied Tube*, 486 U.S. at 500-01. In the present case, Rambus's deceptive conduct *artificially* misdirected JEDEC's standard to one that fell within the respondent's secretly expanded patent claims, contrary to the organization's clear goals to avoid standards that would subject members to substantial royalty payments. The FTC has also challenged misdirection of standard-setting efforts in In re Union Oil Co. of Cal., 2005 WL 2003365 (2005) (consent resolving both Unocal's

The Areeda treatise offers a comparable formulation. It recommends that:

> [t]he Commission should feel free to "enjoin" any unjustified behavior that tends to impair competition and is capable of being differentiated adequately from permissible behavior.[360]

I agree.

In sum, where there is no identifiable, culpable conduct, there is no violation. "Culpable" in this respect does not require specific intent or actual antitrust injury. It must, however, display sufficient anticompetitive attributes – *e.g.*, oppressiveness, lack of an independent business justification, anticompetitive intent, predation, collusion, deceit, a tendency to impair competition – to warrant characterizing it as unfair, and be at least potentially injurious. Where

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proposed merger with Chevron and a separate administrative case alleging that Unocal misrepresented to the California Air Resources Board that Unocal's research regarding low-emissions gasoline was non-proprietary) and In re Dell Computer Corp., 121 F.T.C. 616 (1996) (consent regarding FTC's allegation that Dell Computer failed to disclose its patent rights to the Video Electronics Standards Association despite the group's "affirmative disclosure requirements.").

[360] AREEDA, H OVENKAMP, & BLAIR, *supra* note 41, at 302h3. The treatise offers this statement in criticizing the concepts of "incipient violations" and "policy violations" of the antitrust laws, as they are presented in *Brown Shoe*, 384 U.S. 316, which expressly does not require proof of anticompetitive effects. Although I find these categories useful and well supported in Section 5's history, I agree that the use of Section 5 to enforce competition policy should require at least the tendency to impair competition.

such qualities are present, it is neither inappropriate nor unwise to find Section 5 liability.[361]

V. RAMBUS'S CONDUCT

Such anticompetitive attributes are clearly present here and, sadly, in abundance. Indeed, Rambus's attempts to deceptively subvert JEDEC's laudable standard-setting efforts is precisely the type of behavior that Congress envisioned would fall within Section 5's mandate.

In considering the application of a "stand-alone" Section 5 cause of action to this behavior, it is not necessary to restate the Commission's findings regarding Rambus's deception since these have been detailed elsewhere in the Commission Opinion. Nonetheless, a brief review of some of the most salient facts demonstrates that finding liability under a "stand-alone" Section 5 cause of action would have been fully appropriate in this matter.

Rambus's conduct occurred in the context of a standard-setting effort involving rivals. In most situations involving direct competitors, one might expect, and even encourage, bare-knuckled competition, including strategies based on secrecy, misinforma-

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[361] The Commission, on occasion, has used Section 5 in recent years to address conduct beyond the scope of the antitrust laws, usually in the context of invitations to collude. *See e.g.*, In re Valassis Communications, Inc. (FTC File No. 051 008) (Mar. 16, 2006), *available at* http://www.ftc.gov/os/caselist/051008/051008.htm. In my view, of course, Section 5 offers far greater potential and should be used more fully. While this concurrence discusses the limiting attributes of Section 5 and the predicates of a violation, it does not attempt to prescribe future generic or specific applications of the statute. That, hopefully, will be done by the Commission in future cases.

tion, and misdirection.[362] But standard-setting is not a typical "everyone for himself" competitive situation. It is one in which collaboration can yield a valuable result – in this case, the establishment of a useful foundation for future, competitive and innovative efforts. But it is also a setting in which a participant's deceptive strategies can usurp the group's efforts – and industry-wide force supporting them – to serve its own anticompetitive ends. Participants must play by the rules if the joint goal is to be achieved. If competition policy permits easy subversion of these joint efforts, however, then there is little justification in the first place for risking the collaboration among rivals that effective standard-setting often requires. From a competition policy perspective, standard-setting efforts such as JEDEC's are "high risk/high gain" activities. They can be particularly valuable, on balance, if procedures ensuring fairness are adopted and followed in good faith.[363]

In this instance, Rambus violated any reasonable conception of good faith and fairness, and the proximate, competitive impact of its conduct is clear. Rambus misled the standard-setting body with regard to its own intellectual property interests, while simultaneously participating in JEDEC to learn about the organization's developing standards. Based on this wolf-in-sheep's-clothing pose, Rambus was in a position to, and did, amend its own patent claims in order to secretly convert what was intended to be an openly available industry-standard into a private source of revenues.

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[362] *Berkey Photo*, 603 F.2d at 281 (2d Cir. 1979).

[363] *Allied Tube*, 486 U.S. at 500-01.

For example, early during its participation in JEDEC, Rambus's JEDEC representative, Richard Crisp, learned what technologies were being considered for the SDRAM standard. Crisp related that knowledge to Rambus's patent counsel, and together they considered how to amend Rambus's patent claims so that they would cover the emerging JEDEC standard. Rambus even assigned an engineer to provide technical assistance and ensure the amendments would do their job. Rambus continued to use the knowledge gained at JEDEC to amend its patents in this manner. As noted in a December 1992 Rambus planning document, Rambus sought to "get a copy of the SDRAM spec and check it for features we need to cover as well as features which violate our patents."[364] Crisp's September 1995 statement to Rambus management further sums up Rambus's strategy. He urged that Rambus:

> should redouble our efforts to get the necessary amendments completed, the new claims added and make damn sure this ship is watertight before we get too far out to sea.[365]

Rambus's patent strategy relating to the JEDEC standard clearly had the imprimatur of its management. This strategy was known to senior executives at the company in 1992, implemented by an executive vice president, and approved by its CEO Geoff Tate.[366] Finally, Rambus's 1996 withdrawal letter further misled JEDEC members by omitting the only issued patent that Rambus believed covered JEDEC's DRAM standards, and including a patent that Ram-

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[364] *See supra*, Commission Opinion, at 36-39.

[365] CX 837 at 2.

[366] *See supra*, Commission Opinion, at 37-42.

bus knew (or should have known) was entirely irrelevant.[367]

Rambus did not merely take advantage of the knowledge it gained at JEDEC to ensure it would cover the relevant DRAM standards in its own patent applications; it also did so in direct contravention of JEDEC's broadly-acknowledged purpose: to create consensus-based standards that reflect the interests of all of its members.[368] JEDEC participants' testimony at trial consistently emphasized the wish of JEDEC members to either avoid patented technologies or to secure protections against the unrestricted exercise of patent rights.[369] Even Richard Crisp understood that "[t]he job of JEDEC is to create standards which steer clear of patents which must be used to be in compliance with the standard whenever possible."[370]

While the Commission does not object to covert maneuvers and non-disclosure in typical head-to-head market competition, Rambus's end run around the standard-setting process goes too far. It undermines the policies of the antitrust laws that seek to promote useful innovation and permit joint efforts by rivals that may enhance competition and efficiency. As such, Rambus's conduct would be an unfair

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[367] CX 887 (withdrawal letter); CX 5013 at 2 (Rambus memorandum noting that the '327 patent covered dual edged clocking).

[368] *See, e.g.*, Becker, Tr. 1152; J. Kelly, Tr. 1784-85; CX 2767 at 1.

[369] *See, e.g.*, Sussman, Tr. 1333; Landgraf, Tr. 1693-94; G. Kelley, Tr. 2393-96; Lee, Tr. 6598.

[370] CX 903; Crisp, Tr. 2941-42.

method of competition in violation of Section 5 of the Federal Trade Commission Act.

Indeed, Rambus's behavior epitomizes what Senator Robinson in 1914 viewed to be the essence of unfair competition, namely "oppression or advantage obtained by deception or some questionable means. . . .".[371] Or, turning to more modern expressions, Rambus's behavior contravenes "public values beyond simply those enshrined in the letter or encompassed in the spirit of the antitrust laws."[372] It likewise runs afoul of the Second Circuit's statement in *Ethyl* that the Commission's role under Section 5 is to "protect society against oppressive anticompetitive conduct."[373] Indeed, that court expressly noted that one attribute of "oppressiveness" could be the "artificial standardization of products."[374] It is fair to say that, through its deceptive and exploitative conduct, Rambus effectively co-opted JEDEC's standard- setting process and rendered the JEDEC outcome "artificial."

VI. CONCLUSION

Rambus's abuse of JEDEC's standard-setting process was intentional, inappropriate, and injurious to competition and consumers alike. The Commission Opinion finds that these deceptive practices violate Section 2. Even if this conduct did not violate the Sherman Act, it would have fallen within Section 5's broader province had this claim been argued at trial.

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[371] 51 CONG. REC. 12,248 (1914) (statement of Sen. Robinson).

[372] *Sperry & Hutchinson*, 405 U.S. at 244.

[373] *Ethyl*, 729 F.2d at 136.

[374] *Id.* at 139 n.10.

As for our future enforcement efforts, the framers of the FTC Act gave the Agency a mandate – one unique to the Commission – to use Section 5 to supplement and bolster the antitrust laws by providing, in essence, a jurisdictional "penumbra" around them. The framers also gave the FTC deliberative processes for examining suspected incipient or policy violations of the antitrust laws, and provided remedial measures dedicated more to protecting and restoring competition than to punishing malfeasors. Although the Agency has not ignored its Congressional mandate entirely, we need to build on this foundation and further develop this aspect of our enforcement responsibility – and to use all the arrows in our jurisdictional quiver to ensure that competition is robust, innovative, and beneficial to consumers.

APPENDIX C

IN THE MATTER OF RAMBUS, INC.

[PUBLIC RECORD VERSON]

Docket No. 9302

OPINION OF THE COMMISSION ON REMEDY

By Majoras, Chairman:

I.[1]

On July 31, 2006, the Commission ruled that Rambus Inc.'s "acts of deception constituted exclusionary conduct under Section 2 of the Sherman Act, and that Rambus unlawfully monopolized the markets for four technologies"[2] incorporated into the Joint Electron Device Engineering Council

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[1] This opinion uses the following abbreviations:

CCBR - Complaint Counsel's Brief on Remedy

CCRBR - Complaint Counsel's Reply Brief on Remedy

CX - Complaint Counsel's Exhibit

ID - Initial Decision of the Administrative Law Judge (ALJ)

JX - Joint Exhibits

Op. - Commission's Liability Opinion

RB - Respondent's Brief on Appeal and Cross-Appeal

RBR - Respondent's Brief on Remedy

RRBR -Respondent's Reply Brief on Remedy

RX - Respondent's Exhibit

Tr. - Trial Transcript

[2] Op. at 1.

("JEDEC") standards in violation of Section 5 of the Federal Trade Commission Act ("FTC Act").[3] The Commission further found "a sufficient causal link between Rambus's exclusionary conduct and JEDEC's adoption of the SDRAM and DDR-SDRAM standards (but not the subsequent DDR2-SDRAM standard)."[4]

We asked the parties to provide supplemental briefs on the question of remedy.[5] The parties submitted initial briefs on September 15, 2006, and reply briefs on September 30, 2006. Several interested parties also submitted amicus briefs.[6] We heard oral argument on the issue of remedy on November 15, 2006.

The parties agree that the Commission has the authority to issue an injunction against future deceptive conduct by Rambus. Rambus acknowledged that the Commission has authority to "issue orders broad enough to prevent Rambus from misleading any [standard-setting organization ("SSO")] from

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[3] 15 U.S.C. § 45.

[4] Op. at 5.

[5] *Id.* at 119.

[6] Brief for Amicus Curiae Broadcom Corporation and Freescale Semiconductor, Inc. on the Issue of Appropriate Remedy (Sept. 15, 2006); Brief for Amicus Curiae JEDEC Solid State Technology Association (Sept. 15, 2006); Brief for Amicus Curiae Gesmer Updegrove LLP and Andrew Updegrove on the Issue of Appropriate Remedy (Sept. 15, 2006); Brief for Amicus Curiae Nvidia Corporation, Micron Technology, Inc., Samsung Electronics Corporation, Ltd., and Hynix Semiconductor, Inc. on the Issue of Appropriate Remedy (Sept. 15, 2006); Brief for Amicus Curiae American Antitrust Institute on the Issue of Appropriate Remedy (Sept. 29, 2006).

unknowingly adopting its proprietary technology."[7] To that end, Rambus submitted a proposed order that is limited to prohibiting repetition of the conduct in this case – that is "knowingly" engaging in a deceptive course of conduct as a member of an SSO.[8] We believe the order should be broader. In Part IV, we summarize and explain the terms of the Commission's Order, including the requirement that Rambus cease and desist from future deceptive conduct while a member or a participant in an SSO.

The fundamental question upon which the parties disagree is whether the Commission may order broader relief, and, if broader relief is authorized, on the scope of an appropriate remedy on the basis of the record before us. The Supreme Court has not yet addressed the scope of the Commission's remedial authority where, as here, the Commission has applied the legal standards of Section 2 of the Sherman Act.[9] This counsels caution but does not limit our ability to create a forward-looking remedy tailored to our liability findings. In assessing the appropriate remedy in this case, we have studied the principles that guide the courts in the exercise of their remedial authority in Sherman Act cases.

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[7] RRBR at 12; *see also* RBR at 1.

[8] RBR at 5. In our July 31, 2006, ruling, the Commission determined that Rambus's deceptive course of conduct was "intentionally pursued," Op. at 51, and that Rambus "intentionally and willfully engaged in deceptive conduct." Op. at 68.

[9] 15 U.S.C. § 2. This is not surprising given that the Court has not considered a government Section 2 challenge for over thirty years. *See* Otter Tail Power Co. v. United States, 410 U.S. 366 (1973).

II.

The threshold issue is whether the Commission's remedial authority is limited to prohibitory "cease-and-desist" orders. Rambus argues that Section 5 of the FTC Act "gives the Commission authority [only] to issue forward-looking cease-and-desist orders that prevent conduct deemed to be unlawful and ensure against its repetition."[10] Thus, Rambus concludes, even if it obtained monopoly power as a result of its deceptive course of conduct, the Commission is limited to a mere prohibitory injunction on any future deceptive conduct.[11] Rambus asserts that these limitations are supported by the language of Section 5, decisions of the U.S. Supreme Court and the U.S. Court of Appeals for the District of Columbia Circuit, and Commission testimony in support of the enactment of Section 13(b) of the FTC Act in 1973 to enable the Commission to seek broader relief from district courts.

Rambus's contention that the Commission is limited to prohibiting future deceptive conduct is mistaken. Insofar as the argument is premised on principles of Section 2, it is contrary to clear Supreme Court precedent.[12] Insofar as the argument is based

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[10] RRBR at 2; *see also* RBR at 1, 4-5.

[11] RBR at 2 ("Rambus does not believe . . . that the Commission has or should exercise the statutory authority to order" relief that would affirmatively alter current market conditions).

[12] *See* Schine Chain Theatres, Inc. v. United States, 334 U.S. 110, 128 (1948) ("In this type of case we start from the premise that an injunction against future violations is not adequate to protect the public interest. If all that was done was to forbid a repetition of the illegal conduct, those who had unlawfully built their empires could preserve them intact. They could retain the

on the language of Section 5,[13] it is inconsistent with long-established principles of implied agency authority.[14] The Supreme Court's decision in *FTC v. Dean Foods Co.*[15] recognized that the Commission possesses the ancillary powers essential to the effective discharge of its responsibilities. The Court relied on its earlier decision in *Pan American World Airways, Inc. v. United States,*[16] which held that "'the power to order divestiture need not be explicitly included in the powers of an administrative agency to be part of its arsenal of authority.'"[17]

Indeed, the Commission's authority to terminate the ill effects of a violation repeatedly has been confirmed. As the D.C. Circuit has held, "[I]t is clear that the Commission has the power to shape remedies that go beyond the simple cease and desist order."[18] None of the cases cited by Rambus teaches

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full dividends of their monopolistic practices and profit from the unlawful restraints of trade they had inflicted on competitors.").

[13] The FTC Act states that the Commission shall order an offending party "to cease and desist from using such method of competition or such act or practice." 15 U.S.C. § 45(b).

[14] *See* Neil W. Averitt, *Structural Remedies in Competition Cases Under the Federal Trade Commission Act*, 40 OHIO ST. L.J. 781, 784 (1979) (concluding that "case law has clearly established the Commission's authority [under Section 5 of the FTC Act] to impose divestiture and other affirmative requirements").

[15] 384 U.S. 597, 606-07 (1966) (rejecting an argument that the Commission needed express statutory authority to seek a preliminary injunction).

[16] 371 U.S. 296 (1963).

[17] *Dean Foods*, 384 U.S. at 606 n.4 (quoting *Pan Am.*, 371 U.S. at 312 n.17).

[18] Warner-Lambert Co. v. FTC, 562 F.2d 749, 757 (1977) (upholding the Commission's corrective advertising order

otherwise. To the contrary, in *FTC v. National Lead Co.*,[19] a case involving the Commission's prohibition of specific conduct by which the effects of an unlawful agreement might be continued, the Court held that the Commission had "wide discretion" in bringing an end to the unfair practices at issue, but expressly indicated that it was *not* defining the full scope of Commission powers.[20] The Court also declared that the Commission "was not obliged to assume, contrary to common experience, that a violator of the antitrust laws will relinquish the fruits of his violation more completely than [it] requires."[21]

Since *National Lead*, no court has held, or indicated, that the Commission is powerless to ensure

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designed to terminate the otherwise continuing ill effects of false advertising). *See also* Novartis Corp. v. FTC, 223 F.3d 783, 787 (D.C.Cir. 2000) (upholding corrective advertising order); Detroit Auto Dealers Ass'n, Inc. v. FTC, 955 F.2d 457 (6th Cir. 1992) (upholding, with modification, an order requiring automobile dealers to maintain a minimum number of showroom hours per week in order to eliminate the continuing effects of an unlawful agreement to limit showroom hours); L.G. Balfour Co. v. FTC, 442 F.2d 1, 23-24 (7th Cir. 1971) (upholding FTC order requiring divestiture as remedy for illegal monopolization); Charles Pfizer & Co. v. FTC, 401 F.2d 574, 586 (6th Cir. 1968) (upholding an order requiring compulsory licensing).

[19] 352 U.S. 419 (1957).

[20] *Id.* at 430 n.7 ("We need not discuss the full scope of the powers of the Federal Trade Commission, nor their relative breadth in comparison with those of a court of equity.").

[21] *Id.* at 430 (quoting Int'l Salt Co. v. United States, 332 U.S. 392, 400 (1947)). The Court's declaration in this respect is consistent with its repeated statements that an antitrust wrongdoer can – and should – be made to relinquish the fruits of his violation. United States v. United Shoe Mach. Corp., 391 U.S. 244, 250 (1968); United States v. U.S. Gypsum Co., 340 U.S. 76, 88 (1950).

that antitrust violations are fully remedied.[22] The only remedy issues in *FTC v. Colgate-Palmolive Co.*,[23] a case cited by Rambus in this regard,[24] involved the clarity of the order and the scope of the Commission's "fencing-in" authority.[25] Moreover, the D.C. Circuit in *United States v. Philip Morris USA Inc.*[26] did not speak to the Commission's remedial authority at all, as Rambus represents.[27] That case involved the RICO statute, not the different language of Section 5 of the FTC Act, and the decision rejected a disgorgement order, not an order prospectively terminating the ill effects of unlawful conduct.

Rambus relies on *Reynolds Metals Co. v. FTC*[28] and *Ford Motor Co. v. United States*[29] to argue that the courts have distinguished the Commission's Section 5 authority from a district court's purportedly broader equitable powers.[30] Neither case holds that the

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[22] As the Supreme Court has recognized, in a monopolization case, there is a presumption that a mere prohibitory injunction allows a monopolist "to retain the full dividends of [its] monopolistic practices . . . ." *Schine Chain Theatres*, 334 U.S. at 128; *accord* United States v. Grinnell Corp., 384 U.S. 563, 577 (1966) ("We start from the premise that adequate relief in a monopolization case should . . . render impotent the monopoly power found to be in violation of the Act.").

[23] 380 U.S. 374, 395 (1965).

[24] *See* RBR at 4.

[25] *Id.* at 392-95. *See infra* Part IV (discussing "fencing-in" relief).

[26] United States v. Philip Morris USA Inc., 396 F.3d 1190 (D.C. Cir. 2005).

[27] *See* RBR at 6 n.4.

[28] 309 F.2d 223 (D.C. Cir. 1962).

[29] 405 U.S. 562 (1972).

[30] *See* RRBR at 2-3.

Commission's authority to eliminate the ill effects of a violation is narrower than that exercised by the district courts. Rather than ruling that the Commission's authority is more limited than that of the courts, *Reynolds Metals* merely determined that the record did not support going *beyond* that by ordering divestiture of unrelated assets. The court of appeals in *Reynolds Metals* overturned a Commission order requiring divestiture of a factory acquired after a merger when the Commission had failed to demonstrate that there was "any nexus between the continued possession of [the factory] and the violation of Section 7 . . . " or a need to divest the factory for "restoration of the competitive status quo."[31] In rejecting a suggestion that *Reynolds Metals* limited remedies in a district court action brought by the United States, the Supreme Court's *Ford Motor* opinion cursorily noted that *Reynolds Metals* concerned the enforcement powers of the Commission, not those of the courts; set that issue to the side, without further comment; and proceeded to focus on the appropriate remedy in the district court action before it.[32] In sum, neither opinion provides a basis for Rambus's claim that the Commission is confined to issuing prohibitive injunctions.

We turn next to the legislative history of the 1973 amendments to the FTC Act. Contrary to Rambus's claim,[33] there is no basis for concluding that Congress, in enacting Section 13(b), or the Commission, in requesting the provision, effectively acknowledged the Commission's inability to take action affirma-

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[31] 309 F.2d at 231.

[32] 405 U.S. at 573 n.8.

[33] *See* RRBR at 3.

tively to terminate the ill effects of a violation. To begin with, courts "will not construe an agency's request for authorizing legislation as affirmative proof of no authority; '[p]ublic policy requires that agencies feel free to ask [for] legislation which will terminate or avoid adverse contentions and litigations.'"[34] Moreover, Congress intended Section 13(b) to provide a mechanism that would enable the Commission to obtain equitable relief from district courts without the delay that administrative proceedings entail.[35] Nothing in the legislation or the legislative history of Section 13(b) suggests that the Commission lacks power *after* administrative proceedings have concluded to issue an order requiring a violator to relinquish the "fruits" of its violation of Section 2.[36] Thus, the limitation that the legislation

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[34] *Warner-Lambert Co.*, 562 F.2d at 758 n.39 (quoting *Dean Foods*, 384 U.S. at 610, in rejecting a contention that a congressional grant of court remedial authority meant that the Commission itself lacked such authority).

[35] *See* James T. Halverson, *The Federal Trade Commission's Injunctive Powers Under the Alaskan Pipeline Amendments: An Analysis* 69 NW. U. L. REV. 872-73 (1974-75).

[36] Citing the testimony of Commissioner Elman during a 1969 Congressional hearing, Rambus argues that the Commission itself has recognized limits on its Section 5 authority. *See* RRBR at 3 n.4. Rambus's reliance on the cited testimony is misplaced, however, because former Commissioner Elman's statement relates to the FTC's authority to administratively assess civil penalties and award so-called "civil damages" in consumer fraud cases. *Id.* at 57-70. Morever, as Rambus conceded at oral argument, Commissioner Elman indicated that his testimony represented his own "separate statement" and not necessarily the views of the other Commissioners. *See* Oral Argument before the Commission on the Issue of Remedy (Nov. 15, 2006), at 42-43. Commissioner Elman provided that caveat during a colloquy with Senator Moss, which Rambus did not cite in its brief. *See Consumer Protection: Hearings on S.2246, et al.*,

was designed to correct – the absence of a specific grant of authority to obtain ancillary and preliminary equitable relief in the district courts in aid of administrative adjudicative proceedings – was not a limitation on the remedies that are available to the Commission in crafting an administrative cease-and-desist order.

In sum, we do not agree with Rambus's contention that the Commission's remedial authority is limited to enjoining it from deceiving an SSO in the future. Instead, the Commission's authority extends to restoring, to the extent possible, the competitive conditions that would have been present absent Rambus's unlawful conduct.[37] We now address the Commission's authority to order compulsory patent licenses.

A.

Rambus argues that even if the Commission has remedial power beyond the issuance of a cease-and-desist order, the Commission does not have the authority to order compulsory licensing on terms prescribed by the Commission.[38] Rambus would have us conclude that it can continue to reap the royalty

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before the Consumer Subcomm. of the Comm. on Commerce, 91st Cong. 57 (1969). Rambus also incorrectly relies on other former FTC commissioners' statements, which do not address the Commission's authority to restore competitive conditions after a finding of liability under Section 2. *See* RRBR at 3, n.4; *Agriculture-Environmental and Consumer Protection Appropriations for 1974: Hearings before a Subcomm. of the House Comm. on Appropriations*, 93rd Cong. 99 (1974); S. Rep. No. 93-151, at 10 (1973).

[37] Ekco Products Co., 65 F.T.C. 1163, 1216 (1964), *aff'd*, 347 F.2d 745 (7th Cir. 1965).

[38] RBR at 6.

rates it is now charging (and demanding in pending litigation).[39] Rambus asserts that this conclusion is supported by the Supreme Court's decision in *FTC v. Ruberoid Co.*,[40] in which the Court held that the Commission cannot order compensatory or punitive relief.[41]

We disagree with Rambus. The Commission enjoys "wide latitude for judgment" in fashioning a remedial order, subject to the constraint that the requirements of the order bear a reasonable relationship to the unlawful practices that the Commission has found.[42] The Supreme Court's acknowledgment in *Ruberoid* that orders of the Commission "are not intended to impose criminal punishment or exact compensatory damages for past acts"[43] is not contrary authority. The Court in that case emphasized the Commission's wide discretion in its choice of remedy, and stated the expectation that the Commission would "exercise a special competence in formulating remedies to deal with problems in the general sphere of competitive practices."[44] The district courts similarly exercise broad discretion in determining what kind of decree "will best remedy the conduct [they have] found to be unlawful . . . . This is no less true in antitrust

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[39] *Id.* at 2, 16.

[40] 343 U.S. at 473 (1952).

[41] RBR at 5 n.3.

[42] Jacob Siegel Co. v. FTC, 327 U.S. 608, 613 (1946). *See also Colgate-Palmolive Co.*, 380 U.S. at 394-95; *FTC v. Nat'l Lead Co.*, 352 U.S. at 428-29; *Ruberoid Co.*, 343 U.S. at 473.

[43] 343 U.S. at 473.

[44] *Id.*

cases."[45] The broad authority of the Commission and the district courts to remedy violations of the FTC Act and the other antitrust laws includes "mandatory selling on specified terms and compulsory licensing at reasonable charges."[46]

Courts have blessed compulsory licensing orders in the past,[47] including at least one crafted by the Commission.[48] Following that precedent, the Commission has ordered licensing of intellectual property to remedy antitrust violations in litigated cases.[49] If prospective only (which Complaint Counsel agree it should be), such a compulsory licensing order is not "compensatory." Moreover, as discussed below, if the

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[45] United States v. Microsoft Corp., 253 F.3d 34, 105 (D.C. Cir. 2001) (*en banc*).

[46] United States v. Glaxo Group, 410 U.S. 52, 64 (1973). *See also* Besser Mfg. Co. v. United States, 343 U.S. 444, 447 (1952) ("compulsory patent licensing [on a fair royalty basis] is a well-recognized remedy where patent abuses are proved in antitrust actions and it is required for effective relief"); Am. Cyanamid Co., 72 F.T.C. 623, 690 (1967) (requiring licensing at a specified, non-zero royalty rate), *aff'd*, Charles Pfizer & Co. v. FTC, 401 F.2d 574 (6th Cir. 1968).

[47] See United States v. Nat'l Lead Co., 332 U.S. 319, 349 (1947) (upholding compulsory licensing remedy); United States v. United Shoe Mach. Corp., 110 F. Supp. 295, 351 (D. Mass. 1953) (same).

[48] Am. Cyanamid Co v. FTC, 363 F.2d 757, 772 (6th Cir. 1966) ("assuming the facts found by the Commission to be supported by substantial evidence, the Commission had jurisdiction to require as a remedy the compulsory licensing of tetracycline and aureomycin on a reasonable royalty basis.").

[49] *See* Grand Calliou Packing Co., *Inc.*, 65 F.T.C. 799 (1960), *rev'd in part on other grounds sub nom.*, La Peyre v. FTC, 366 F.2d 117 (5th Cir. 1966); Am. Cyanamid Co., 63 F.T.C. 1747 (1963) – an early ruling in the series of *American Cyanamid* cases cited in footnotes 46 and 48.

order attempts to replicate the "but for" world – *i.e.*, the circumstances that would exist had Rambus not engaged in its deceptive course of conduct – such an order is not "punitive." It would simply stop Rambus from continuing to exploit its illegally acquired monopoly power in violation of Section 2 and terminate the anticompetitive effects of the deceptive course of conduct by which it acquired that monopoly power.

B.

Complaint Counsel ask the Commission to enjoin Rambus from enforcing its pre-1996 patents with respect to JEDEC-compliant products.[50] In effect, Complaint Counsel request that the Commission order royalty-free compulsory licenses for Rambus's pre-1996 patent portfolio for those firms practicing JEDEC's standards. Complaint Counsel argue that this remedy – "far from being extreme – merely restores, six years later, the competitive conditions that should have prevailed" had Rambus not engaged in deception.[51] Moreover, Complaint Counsel argue that imposition of royalty-free compulsory licenses is well within the Commission's broad discretion to restore competition and to deny Rambus the benefits of its illegal conduct.[52] We agree that the Commission has that authority.

Rambus argues that the Commission lacks the power to order any form of royalty-free licensing.[53] In support of this proposition, Rambus quotes *Hartford-*

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[50] CCBR at 1-2.

[51] CCBR at 2.

[52] CCBR at 3, 11.

[53] RBR at 7-8; RRBR at 3-4.

Empire Co. v. United States[54] that "it is difficult to say that, however much in the past such defendant has abused the rights thereby conferred [by a patent], it must now dedicate them to the public."[55] Rambus also quotes from *United States v. National Lead*,[56] in which the Supreme Court stated that reducing "all royalties automatically to a total of zero ... appears, on its face, to be inequitable without special proof to support such a conclusion."[57] Thus, Rambus would have us rule out a royalty-free licensing remedy, however limited, as a matter of law. We do not agree that the Commission is precluded from imposing such a remedy as a matter of law.

Compared to the extensive treatment of liability standards, antitrust courts have devoted relatively little attention to the question of remedies. The comparatively few modern cases that have addressed remedies have provided limited guidance about the suitability of specific cures for illegal monopolization.[58] In general terms, previous decisions have placed non-damage civil remedies on a spectrum. At one end of the spectrum are controls on conduct, which the cases tend to depict as relatively less drastic. At the other end are structural measures such as divestiture, which courts have tended to

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[54] 323 U.S. 386 (1945).

[55] *Id.* at 415.

[56] 332 U.S. 319 (1947).

[57] 332 U.S. at 349; *see also* RRBR at 4.

[58] *See* Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestitures in Network Industries*, 68 U. CHI. L. REV. 1, 45 (2001) ("The jurisprudence of the Sherman and Clayton Antitrust Acts does not enunciate grand principles for the design of optimal remedies. One can observe recurrent themes, but they must be teased out of the disparate cases.").

regard as being more drastic. Compulsory licensing often lies between the two ends of the spectrum, although courts sometimes have likened compulsory licensing to "structural" relief where the licensing at issue enables the licensee to compete against the defendant in the relevant product market.[59] As we discuss below, the cases appear to establish the broad proposition that, as the plaintiff's demands for relief move across the spectrum from less drastic (conduct) solutions toward more drastic (structural) solutions, the plaintiff's duty to establish the need for such remedial intervention increases.

Compulsory patent licensing on a reasonable royalty basis is a well-recognized remedy,[60] yet few litigated decisions have ordered royalty-free compulsory licensing. Each time the Supreme Court has considered royalty-free licensing, it has determined that, under the facts presented, a less powerful remedy would suffice to restore competition.[61] We

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[59] *See, e.g.*, New York v. Microsoft Corp., 224 F. Supp. 2d 76, 186, 244 (D.D.C. 2002) (analogizing the proposed remedy, which included a requirement for royalty-free licensing of software, to a divestiture of assets and therefore as "structural" in nature), *aff'd sub nom.* Massachusetts v. Microsoft Corp., 373 F.3d 1199 (D.C. Cir. 2004). We note that the royalty-free compulsory licensing remedy that we are contemplating here would be more limited because it would apply only to certain JEDEC-compliant technologies; Rambus would be free to charge whatever royalties it wished otherwise.

[60] The availability of compulsory licensing at reasonable royalties is well-established in the Supreme Court's jurisprudence on antitrust remedies. *See Glaxo Group*, 410 U.S. at 62; *Besser Mfg. Co.*, 343 U.S. at 448-49; *Nat'l Lead*, 332 U.S. at 348-49; *Hartford-Empire*, 323 U.S. at 418-19.

[61] In *Hartford-Empire*, for example, the Supreme Court rejected royalty-free licensing as a remedy for Sherman Act and Clayton Act violations arising from a patent pooling arrange-

know of one litigated ruling in which royalty-free licensing was ordered.[62]

Cases such as *Hartford-Empire* have expressed caution about royalty-free licensing,[63] but the Supreme Court has not foreclosed the availability of this form of relief. Two years after *Hartford-Empire*, the Supreme Court in *United States v. Nat'l Lead* explicitly left open the possibility that, under different facts, the remedy of royalty-free licensing might be necessary and appropriate.[64] Thus, the Commission has previously declared, and we agree, that "where

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ment. Concerned that the remedy went "beyond what is required to dissolve the combination and prevent future combinations of like character[,]" 323 U.S. 386 at 414, the Court allowed for a reasonable royalty instead of the requested royalty-free licensing. Similarly, the Court rejected the Government's proposal for royalty-free licensing in United States v. Nat'l Lead, a case in which a "proliferation of patents" and related agreements led to the "domination of an entire industry" and a violation of Section 1 of the Sherman Act. 332 U.S. at 327-28. The Court concluded that "licenses at uniform, reasonable royalties" would be sufficient to accomplish the discontinuance and prevention of the illegal restraints and patent misuse at issue. *Id.* at 348.

[62] *See* United States v. Gen. Elec. Co., 115 F. Supp. 835 (D.N.J. 1953).

[63] *See* Hartford-Empire, 323 U.S. at 414-15 (stating reservations about the imposition of royalty-free licensing and concluding that royalty-free licensing was not warranted in the case at hand).

[64] United States v. Nat'l Lead, 332 U.S. at 349. *Compare Schine Chain Theatres*, 334 U.S. at 128-30 (endorsing the availability of structural remedies of divestiture or dissolution to cure illegal monopolization).

the circumstances justify such relief, the Commission has the authority to require royalty-free licensing."[65]

Although the Commission has the authority to require royalty-free licensing, the exercise of that power is subject to important limits. The courts, speaking in varying terms, have insisted on "special proof" for such remedies. This requirement is not well-specified in the cases. In the formative decision on this point, *United States v. Nat'l Lead*, the Supreme Court found that the "special proof" needed to justify royalty-free licensing was lacking, but the Court did not elaborate upon the meaning of this term.[66] Although the parties' briefs provide no

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[65] *Am. Cyanamid Co., supra* at n.46. In a number of consent orders, the Commission has accepted the prohibition of enforcement of patents as a remedy. For example, in *Dell Computer Corp.*, 121 F.T.C. 616, 620-22 (1996) and *Chevron Corp.*, 140 F.T.C. 100 (2005), *available at* http://www.ftc.gov/os/decisions/docs/volume140.pdf (Aug. 2, 2005), the Commission approved consent orders that prohibited enforcement of patents against those practicing a standard. *See also* Eli Lilly & Co., 95 F.T.C. 538, 546-52 (1980) (ordering royalty-free licensing of patents); Xerox Corp., 86 F.T.C. 364, 373-83 (1975) (same). In addition, in the context of alleged violations of Section 7 of the Clayton Act, the Commission has approved consent orders that require divestiture or licensing of, or place other limitations on, patent rights. *See, e.g.*, Cephalon, Inc., 138 F.T.C. 583, 604 (2004), *available at* http://www.ftc.gov/os/decisions/docs/volume138.pdf.

[66] In United States v. Nat'l Lead, the Court observed that the growing strength of royalty-paying licensees demonstrated that royalty-free licenses were not essential to their ability to compete. 332 U.S. at 351. In contrast, the district court in *General Electric*, 115 F. Supp. at 844, found that, in light of GE's vast arsenal of patents and the narrow cost margins that prevailed in the market for lamps and related parts, smaller firms would be unable to gain a foothold in the market if they had to bear

insights on this point, Complaint Counsel stated at oral argument that "special proof" means "proof of the competitive conditions [that] would have existed absent the conduct in question that would not have resulted in any enforcement of the patent."[67] Accordingly, Complaint Counsel ask us to find that the "special proof" requirement is satisfied here by evidence that they believe demonstrates that Rambus would have received no royalties at all in the "but for" world. Without embracing a precise definition of "special proof," we agree that, before ordering royalty-free licensing, Complaint Counsel must show that this form of relief is necessary to restore the competitive conditions that would have prevailed absent Rambus's misconduct. We discuss whether Complaint Counsel have met that burden in Part III of this Opinion.

Rambus, on the other hand, argues that "the burden to justify a remedy that would restrict Rambus's ability to license its patents is heavier than the burden to establish liability."[68] In support of this proposition, Rambus cites *United States v. Microsoft Corp.*,[69] in which the D.C. Circuit held that "structural relief, which is 'designed to eliminate the monopoly altogether . . . require[s] a clearer indication of a *significant causal connection* between the conduct and creation or maintenance of the market

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any licensing fees. Therefore, the court determined that royalty-free licensing was necessary to restore competition. *Id.*

[67] Oral Argument before the Commission on the Issue of Remedy (Nov. 15, 2006), at 23.

[68] RBR at 7; *see also* RRBR at 6.

[69] 253 F.3d 34 (D.C. Cir. 2001).

power.'"[70] Most recently, in *Massachusetts v. Microsoft Corp.*,[71] the D.C. Circuit, affirming the district court's refusal to order royalty-free licensing, held that requiring Microsoft to license Internet Explorer on a royalty-free basis, as sought by the Common wealth of Massachusetts, was a "de facto" divestiture that would require a more "significant causal connection."[72] Collectively, the case law appears to indicate that the farther remedies expand beyond simple prohibitions against future anticompetitive conduct (with divestiture at the other outer end), the stronger the proof that is needed to justify the remedy.

We reaffirm that the Commission has the authority to order royalty-free licensing when the factual circumstances justify it. With the guiding principles of the case law discussed above firmly in mind, we turn to determining the appropriate remedy in this case based on the record before us. Having found liability, we want a remedy strong enough to restore ongoing competition and thereby to inspire confidence in the standard-setting process. At the same time, we do not want to impose an unnecessarily

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[70] *Id.* at 111 (*quoting* 3 PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION, ¶ 653b at 91-92) (2d ed. 2002) (emphasis in original)); *see also* AREEDA, ¶ 653c at 100 n. 8 ("Compulsory licensing of intellectual property rights could . . . constitute 'structural' relief, particularly when intellectual property rights make up a significant part of defendant's output.").

[71] 373 F.3d 1199 (D.C. Cir. 2004).

[72] *Id.* at 1233.

restrictive remedy that could undermine the attainment of procompetitive goals.[73]

III.

A.

The question, then, becomes whether Complaint Counsel are correct that we should order royalty-free licensing here. Complaint Counsel contend that they have offered "special proof" that justifies requiring Rambus to license its technology royalty-free. Specifically, according to Complaint Counsel, enjoining enforcement of the relevant patents against JEDEC-compliant products is appropriate because, absent Rambus's deception, JEDEC would have selected alternative technologies – including alternatives with inferior performance – in lieu of paying royalties, thus leaving Rambus with no claim to royalties.[74]

Rambus, however, contends that there is no basis for the Commission to assume that Rambus – had it disclosed its patents – would have been left with no claim to royalties. According to Rambus, JEDEC selected, and thereby showed a preference for, Rambus technologies after serious and searching consideration of the alternatives.[75] Furthermore, Rambus contends, JEDEC also would have preferred Rambus's technologies in the "but for" world in which

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[73] Op. at 3, 33. The Commission has stressed the contribution of intellectual property to innovation and consumer welfare, and has cautioned against unwarranted antitrust enforcement activity that might undermine the patent system's incentives for innovation. *See* FED. TRADE COMM'N, TO PROMOTE INNOVATION, THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY, ch.1 at 2 (2003).

[74] CCBR at 4-5.

[75] RBR at 8, 11.

Rambus had disclosed its patent position.[76] At most, according to Rambus, JEDEC would have requested a commitment to license on reasonable and nondiscriminatory ("RAND") terms, and Rambus would have had no real choice but to comply.[77] Thus, according to Rambus, because Rambus would have received royalties for its patented technologies, Complaint Counsel lack adequate support for their contention that "a zero-royalty remedy flows directly from Rambus's misconduct."[78]

We recognize that Rambus's unlawful conduct makes it difficult to reconstruct the "but for" world, as is typically the case when a party has violated the antitrust laws. We conclude, however, that Complaint Counsel have not satisfied their burden of demonstrating that a royalty-free remedy is necessary to restore the competition that would have existed in the "but for" world – *i.e.*, that absent Rambus's deception, JEDEC would not have standardized Rambus technologies, thus leaving Rambus with no royalties.

We have examined the record for the proof that the courts have found necessary to impose royalty-free licensing, but do not find it. Our liability opinion identified two realistic possibilities for what would have occurred had Rambus not engaged in deception of JEDEC members: either (i) JEDEC would have chosen alternative technologies, or (ii) JEDEC would have incorporated Rambus's technologies into the standard but would have demanded, as a pre-condition of adopting Rambus's technology, that Rambus

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[76] RBR at 10; RRBR at 9.

[77] RRBR at 10.

[78] CCRBR at 6.

agree to license the technology on RAND terms.[79] There is evidence in the record to support both possibilities.

As to the first possibility, it is true that if JEDEC had chosen to include other, non-Rambus technologies, its members would have paid no royalties to Rambus. But that does not mean that incorporating those technologies rather than the Rambus technologies would have been costless. Because Rambus's cost analysis was faulty,[80] and Complaint Counsel did

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[79] Op. at 74.

[80] Although Rambus presented its analysis of relative costs and performance characteristics of the relevant Rambus technologies and their alternatives, the Commission found Rambus's calculations "fraught with uncertainty and potential for error" and concluded that Rambus had failed to demonstrate that alternatives would have been more expensive or that JEDEC would have standardized Rambus's technologies even if Rambus had disclosed its patent position. Op. at 94.

With respect to these and other evaluations of the evidence in the record – both here and in the July 31, 2006, liability opinion – the Commission, "to the extent necessary or desirable, exercise[s] all the powers which it could have exercised if it had made the initial decision." 16 C.F.R. 3.54(a). Thus, in particular, any Commission citation to any trial testimony, exhibit, or deposition segment – either in this opinion or in the July 31, 2006, opinion – constitutes a determination by the Commission that the cited testimony, exhibit, or deposition segment is relevant, material, and reliable evidence, and therefore admitted into the record of this proceeding. 16 C.F.R. 3.43(b). Each such determination shall be conclusive, with respect to determining the contents of the record of this proceeding, notwithstanding any objection or response thereto registered by either Complaint Counsel or Counsel for Respondent. The Commission also has determined that all exhibits listed on the Joint Exhibit Index filed by Complaint Counsel and Counsel for Respondent on September 29, 2003, whether or not marked as "pending," are admitted into the record of this proceeding, with any objections

not provide a cost-benefit comparison of the available technologies, we do not know what the costs might have been. We do know, however, that without knowledge that payment of royalties to Rambus would be required, JEDEC found the Rambus technologies desirable and chose them for the JEDEC DRAM standards. On the current record, we can neither confirm nor reject the possibility that JEDEC would have preferred Rambus's technologies over the alternatives, even with some reasonable royalty. Yet, for purposes of supporting the need for a zero-royalty remedy, it was Complaint Counsel's burden to show that Rambus would not have received reasonable royalties in the "but for" world.

Complaint Counsel suggest that the evidentiary gap can be closed because Rambus would not have issued the commitment to license on RAND terms required by JEDEC and EIA regulations. Complaint Counsel point to evidence that shows that Rambus did not want to license technology on RAND terms and that it even made statements that offering RAND terms was contrary to its business model.[81] Rambus, however, had not disclosed its patents at the time of these statements. An unwillingness to comport with JEDEC policy while pursuing a hold-up strategy is not necessarily indicative of how Rambus would have acted after disclosure, when hold up no longer was attainable.

It is hardly surprising that Rambus would rather have the freedom to choose what license fees to

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and responses thereto as to any exhibit marked "pending" going to the weight to be accorded that exhibit, rather than to its admissibility.

[81] CCRBR at 10.

charge than to be required to license on RAND terms Indeed, Rambus was so desperate to avoid having to license on RAND terms that it chose to deceive JEDEC rather than to succumb. But that also shows how desperate Rambus was to have its technology incorporated into the standard. Rambus does not manufacture anything; it innovates, obtains patents, and then licenses.[82] To conclude that, had Rambus "come clean," it still would have refused JEDEC's demand for RAND terms because it preferred licensing according to its own terms, is to conclude that Rambus, faced with two choices it did not like, would have chosen the path that resulted in no royalties from SDRAM and DDR and other technologies becoming the industry standard.[83] This is hard to square with the fact that "[r]oyalties are the lifeblood of Rambus"[84] and its reiterated objective of "get[ting] royalties from competitive memory."[85] Further, the record suggests that despite its protestations, Rambus was indeed willing to cater to the demands of powerful buyers,[86] and JEDEC, *ex ante*, was a very powerful potential source of business.[87]

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[82] Op. at 7.

[83] *See* Teece, Tr. 10740-46.

[84] CX 2106 at 221 (deposition transcript at 220) (Farmwald FTC Dep.) (*in camera*). *See also* Farmwald, Tr. 8095, 8150, 8248; RX 82 at 18.

[85] CX 5110 at 2.

[86] For example, Rambus licensed its RDRAM technology at rates quite favorable to Samsung, a significant market participant. In the Samsung RDRAM license, the applicable royalty rate drops to zero five years after shipment of the 500,000th unit, provided that more than 10 million units had been shipped. CX 1592 at 23.

Given JEDEC's ability to turn to alternatives to Rambus's patented technologies and the historic importance of JEDEC standards to industry success, a choice by Rambus to forgo participation in the JEDEC standard at a reasonable royalty rate is not easily assumed without stronger evidence than Complaint Counsel have presented.[88]

Both dissents express the view that Rambus would not have offered a RAND commitment because Rambus's proprietary DRAM technology, RDRAM, was a "flagship" product, and Rambus would not have torpedoed its flagship to secure royalties on SDRAM and DDR SDRAM.[89] Nothing in the record, however, suggests that SDRAM and DDR SDRAM would have foundered if Rambus had withheld its four patented technologies.[90] If the Rambus technologies in SDRAM and DDR SDRAM came at a royalty equal to their value-added, so that improved performance carried with it commensurately higher cost, it is not clear why RDRAM would have been disadvantaged by their adoption. Moreover, the record suggests that

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[87] *See* Op. at 78-79 (noting "the historical record of the predominant market position of DRAMs compliant with the JEDEC standards"). JEDEC was a "broad-based organization that included essentially all the DRAM manufacturers and their largest customers." *Id.* at 78.

[88] *See* Teece, Tr. 10740-46 (testifying that Rambus had economic incentives to offer RAND assurances in a "but for" world in which it had already disclosed its patent position).

[89] Rambus developed RDRAM as a proposed solution to the computer hardware industry's "memory bottleneck problem." *See* Op. at 6-7.

[90] Rambus documents evince a belief that development of SDRAM was inevitable. *See, e.g.*, CX 672 at 1 ("SDRAMs will happen.").

Rambus was proceeding on *two* tracks – developing RDRAM *and* pursuing royalties through SDRAM/DDR SDRAM[91] – and it seems unlikely that Rambus would have abandoned the latter track at the very time that royalties could have been secured.

As to the second possibility – that JEDEC would have standardized Rambus's technologies upon receipt of a RAND commitment – the evidence shows, and in the liability opinion the Commission found, that JEDEC was reluctant to incorporate patented technologies.[92] JEDEC's minutes state, "If it is known that a company has a patent on a proposal then the Committee will *be reluctant* to approve it as a standard."[93] This, too, is hardly surprising, given that all firms would strongly prefer to use technology without the cost of license fees. The minutes do not, however, state that the committee will *not* standardize a patented technology, and the basic JEDEC

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[91] *See, e.g.*, CX 1267 (1995 Rambus document, identified at Diepenbrock, Tr. 6129-31, headed "IP Strategy" announcing, with equal weight, in one column a "Defensive" strategy built around protecting RDRAM and in the other column an "Offensive" strategy based on "[f]ind[ing] key areas of innovation in our IP that are essential to creating a competing device to [RDRAM]" and "claim[ing] these areas as broadly as possible within the scope of what we invented"); CX 543 at 16-17 (June 1992 Rambus business plan identifying the marketing of RDRAM as the number one strategy while simultaneously articulating a strategy of capturing royalties from SDRAMs by "be[ing] in a position to request patent licensing (fees and royalties) from any manufacturer of Sync DRAMs").

[92] Op. at 74-75.

[93] JX 5 at 4 (emphasis added).

and EIA documents repeatedly spell out procedures under which patented technologies may be accepted.[94]

Moreover, the record identifies several occasions in which JEDEC incorporated patented technologies into some standards after securing agreement from the patent holder that the technologies would be licensed on RAND, or specific-royalty, terms: (1) JEDEC retained Texas Instruments's ("TI") Quad CAS patented technology in 1993 after TI provided written assurances complying with EIA patent policy[95]; (2) JEDEC selected Motorola patented technology for the SDRAM standard in 1992 after Motorola provided a letter offering RAND assurances[96]; and (3) JEDEC approved Digital Equipment Corporation's patented technology for an MPDRAM standard in 1990 after DEC agreed to license at a 1% royalty rate.[97] In addition, JEDEC's DRAM Task Group chairman, Gordon Kelley, testified that in "several instances[,]" JEDEC ceased consideration of alternatives once a RAND commitment letter on a patented technology had been received.[98] We have

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[94] *See* CX 208 at 19 (JEDEC's Manual of Organization and Procedure, JEP 21-I) (stating that "committees should ensure that no program of standardization shall refer to a product on which there is a known patent *unless* all the relevant technical information is known to the formulating committee[,] subcommittee, or working group" and specifically providing for including patented technologies on receipt of a written RAND assurance) (emphasis added); *see also* EIA publications EP-7-A, CX 207a at 8, and EP-3-F, CX 203a at 11 (containing similar provisions).

[95] JX 25 at 5-6.

[96] JX 13 at 9-10, 136.

[97] JX 1 at 6, 24.

[98] G. Kelley, Tr. 2708-09.

considered that on one occasion JEDEC rejected a technology known to be covered by a Rambus patent.[99] But that occurred nearly a year *after* Rambus had left JEDEC, leaving JEDEC with no way to impose the RAND requirement.

Complaint Counsel cite to the testimony of multiple JEDEC members that they likely would have opposed using the technologies in question and instead selected alternatives had they known of Rambus's patent applications.[100] While this testimony has some persuasion, it is ambiguous at times and – because it is based on a "but for" hypothetical – necessarily speculative, albeit sincere. The testimony of market participants, especially customers, is always important in the Commission's decisions. But we must look not only to what these members say they *would* have done, but also at what they actually have done. Here, the evidence shows that JEDEC members agreed to incorporate patented technologies into the SSO's standards in several instances, described above.

We reiterate that we agree with our colleagues Commissioner Rosch and Commissioner Harbour that the Commission has the authority to order royalty-free licensing. We also respect their differing conclusion regarding the "but for" world, construction of which is no simple or certain task. If we shared their assessment of the facts on this issue, we might well have endorsed a more powerful form of relief. We conclude, however, that while there is some evidence that supports the possibility that JEDEC

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[99] *See* Op. at 74 n.403 (describing JEDEC's reaction to a proposal for a "loop-back" clock system).

[100] CCBR at 5.

would have chosen alternative technologies, Complaint Counsel have not met the burden of demonstrating that restoring the competition that would have existed in the "but for" world requires that Rambus license its technology with no compensation.

B.

We therefore are left with the task of determining the maximum reasonable royalty rate that Rambus may charge those practicing the SDRAM and DDR-SDRAM standards.[101] Royalty rates unquestionably are better set in the marketplace, but Rambus's deceptive conduct has made that impossible. Although we do not relish imposing a compulsory licensing remedy, the facts presented make that relief appropriate and indeed necessary to restore competition.

There is no direct evidence as to what royalty rates would have resulted from *ex ante* SDRAM negotiations among the parties had Rambus not engaged in the unlawful conduct. Naturally, adjudicators rarely if ever have such direct proof of the "but for"

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[101] Rambus argues that "if the Commission wishes now to replicate the conditions that would have existed in the but-for world, it should enter an order requiring Rambus to license the four relevant technologies to manufacturers of SDRAM or DDR SDRAM-compliant devices on RAND terms – that is, the terms on which Rambus would have been obligated to license those technologies if it had given a RAND commitment when it was a member of JEDEC." RBR at 14. To simply order Rambus to henceforth license on RAND terms undoubtedly would be fruitless, however. We already know that Rambus's views about what RAND terms would be differs from the views of the licensees. Consequently, if we do not set the maximum rate now, we will simply invite more disputes that we likely will have to resolve eventually.

world before them.[102] An antitrust remedy, however, can be adequate even if knowledge of the "but for" world is imperfect. As the Supreme Court explained in *J. Truett Payne Co. v. Chrysler Motors Corp.*, "the vagaries of the marketplace usually deny [courts] sure knowledge of what [an antitrust] plaintiff's situation would have been in the absence of the defendant's antitrust violation."[103] Indeed, to require the kind of detailed and concrete proof of injury that is available in other contexts would allow a wrongdoer to benefit from the uncertainty that its own unlawful conduct has created.[104]

Consistent with JEDEC policies and practices for the adoption of patented technologies in standards determinations, and our own findings in the liability opinion,[105] we conclude that in the "but for" world Rambus's royalty rates would have been negotiated

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[102] Even if we had a more complete record, we would not be able to apply a simple formula to predict "but for" royalties. In a "but for" world, the parties would have arrived at a rate on the basis of a number of factors that are not easily quantifiable – *e.g.*, the respective negotiating skills and strengths of the parties and their respective business plans. *Cf.* Georgia Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1121 (S.D.N.Y. 1970) (economic significance of the factors relevant to establishing a reasonable royalty for purposes of calculating infringement damages cannot be "automatically transduced into their pecuniary equivalent"), *aff'd as modified*, 446 F.2d 295 (2d Cir. 1971).

[103] 451 U.S. 557, 566 (1981). *Accord* Conwood Co. v. U.S. Tobacco Co., 290 F.3d 768, 794 (6th Cir. 2002).

[104] *J. Truett Payne Co.*, 451 U.S. at 566-67 (citing Bigelow v. RKO Radio Pictures, Inc., 327 U.S. 251, 264-65 (1946)).

[105] Op. at 97 (finding that JEDEC and EIA policies would have prohibited standardization of Rambus's patented technologies absent a RAND commitment).

under the constraint of a RAND commitment. A reasonable royalty "is or approximates the outcome of an auction-like process appropriately designed to take lawful advantage of the state of competition existing ex ante . . . between and among available IP options."[106] The parties agree that the "*ex ante* value of a technology is the amount that the industry participants would have been willing to pay to use a technology over its next best alternative prior to the incorporation of the technology into a standard."[107]

The adoption of Rambus's technologies for the standard shows that JEDEC believed that – putting royalties aside – Rambus's technologies were superior to alternatives. JEDEC members likely would have been willing to pay some amount reasonably reflecting that superiority. It is also true, however, that the record does not permit us precisely to quantify the closeness of substitution between Rambus's technologies and the alternatives and the degree to which those alternatives would have entailed higher costs to achieve the same level of DRAM performance, higher costs in the form of decreased DRAM performance, or both.[108]

Lacking this information, we nevertheless consider and balance evidence that:

1. Alternative technologies were available, and it likely would have been possible for

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[106] Daniel G. Swanson and William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power*, 73 ANTITRUST L.J. 1, 57 (2005).

[107] RBR at 12 (quoting Complaint Counsel's Proposed Finding of Fact No. 2965 at 388).

[108] As discussed in our liability opinion, the evidence that Rambus provided was flawed and unreliable. Op. at 82-96.

members to design around Rambus's patents, albeit possibly with some higher cost;[109]

2. Absent any royalties, JEDEC members preferred Rambus's technology;

3. JEDEC had a stated preference for open, patent-free standards,[110] and its members were highly cost-sensitive;[111] and

4. Rambus, despite its preference to avoid RAND commitments, had a strong economic incentive to do what was necessary to ensure that its technology was incorporated into JEDEC's standards.[112]

In determining what royalty rates likely would have resulted from *ex ante* SDRAM negotiations, the Commission may look to real-world examples of negotiations involving similar technologies. Rambus agrees that this is the correct approach, noting that "the best way to determine these [RAND] rates is by examining rates for other comparable licenses in the industry."[113] Complaint Counsel seem to agree, at least by implication, because they argue that the October 2000 Samsung SDRAM/DDR SDRAM license

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[109] *Id.* at 76, 82-96.

[110] *See, e.g.*, JX 5 at 4; CX 203a at 11; CX 207a at 8; CX 208 at 19.

[111] *Id.* at 74-75.

[112] *See, e.g.*, Teece, Tr. 10341-46. *See also* CX 2106 at 221 (deposition transcript at 220) (Farmwald FTC Dep.) (*in camera*) ("[r]oyalties are the lifeblood of Rambus"); CX 5110 at 2-3 (Rambus's business objective was "get[ting] royalties from competitive memory").

[113] RBR at 16. As discussed below, Rambus disagrees with our specific application of the approach taken herein, but it nonetheless endorses the general methodology.

agreement and the March 2005 Infineon SDRAM and DDR SDRAM license agreement with Rambus indicate that the highest possible royalty rate in the "but for" world would be less than 0.25% on JEDEC-compliant DRAMs.[114] Similarly, the court in *Georgia Pacific*, a seminal source regarding the methodology for calculating a reasonable royalty owed to patent holders following a finding of infringement, identified several factors potentially pertinent to that exercise, including, prominently, "the rates paid by the licensee for the use of other patents comparable to the patent in suit."[115] That court looked to multiple factors, seeking to exercise "a discriminating judgment reflecting its ultimate appraisal of all pertinent factors in the context of the credible evidence."[116]

C.

The Commission will extrapolate *ex ante* SDRAM and DDR SDRAM royalty rates using as its starting point the RDRAM license agreements found in the record. As we explained in our liability opinion, beginning in 1990, Rambus offered to license its RDRAM technology to manufacturers of DRAM chips and DRAM-compatible microprocessors, and it sought to "position RDRAM as the *de facto* standard."[117]

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[114] CCBR at 19-20.

[115] 318 F. Supp. at 1120. *Accord* Mobil Oil Corp. v. Amoco Chems. Corp., 915 F. Supp. 1333, 1354 (D. Del. 1994) (noting that parties' experts agreed that the price of comparable technology was of primary importance in determining a royalty rate); *see also* Mahurkar v. C.R. Bard, Inc., 79 F.3d 1572, 1579 (Fed. Cir. 1996) (noting that the task of calculating reasonable royalty is simplified when the record shows an established rate for "related patents or products").

[116] *Georgia Pacific*, 318 F. Supp. at 1120-21.

[117] Op. at 8.

RDRAM failed to achieve significant market success, however, as industry participants instead turned to standards promulgated by JEDEC – which they hoped would represent a better value proposition.[118] RDRAM royalty rates nevertheless serve as an extraordinarily useful benchmark because they are the product of individual, arm's-length negotiations between Rambus and manufacturers of DRAM chips and DRAM-compatible components for the use of all of the technologies at issue in this case, and more.[119] The manufacturers were aware early on that Rambus claimed patent protection for the RDRAM technologies,[120] and there was no lock-in at the time these agreements were negotiated. In our effort to restore competitive conditions to those that would have prevailed in the "but for" world, for the reasons described above, we deem the RDRAM license agreements as the best available evidence from which to

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[118] *Id.*

[119] *See* Op. at 115 n.624 ("RDRAM royalties cover all four of the technologies at issue in this proceeding, as well as additional proprietary technologies. *See, e.g.*, Horowitz, Tr. 8547-48; RX 2183; RX 81 at 8."); CX 2092 at 132 (Crisp *Infineon* Trial Tr.) (*in camera*) (stating that the ideas added to Rambus patent applications for the mode register and for programmable CAS latency were ideas **[redacted**]. Rambus has acknowledged this point. *See* Rambus Response to Complaint Counsel's Proposed Findings of Fact No. 723 at 285 (stating that "[w]hen first developed, RDRAM technology contained . . . the use of registers on the DRAM to store latency values, a variable burst length for data transfers, dual edge clocking in a synchronous memory device, and on-chip DLL or PLL.").

[120] *See, e.g.*, G. Kelley, Tr. 2504; Kellogg, Tr. 5053; Bechtelsheim, Tr. 5828-29, 5841-42; Lee, Tr. 6610-11; RX 279 at 8.

base our estimate of the likely "but for" results of negotiation.[121]

During the 1990s, Rambus licensed its proprietary RDRAM technologies at high-volume rates averaging 1-2% for use in DRAM chips,[122] with the rates declining significantly over time and with increases in the number of shipped units.[123] In the Samsung RDRAM license, for example, the rate drops to zero five years

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[121] Rambus cites evidence of royalty rates for other semiconductor technologies as a basis for an appropriate remedy. RBR at 18-20. We examined this evidence in our liability decision and determined that Rambus had provided no basis for treating the referenced licensing arrangements as comparable to licenses for the technologies here at issue. Op. at 114-15 n.624 (quoting Rambus CEO Geoffrey Tate's testimony that comparing royalty rates for different technology licenses mixes "apples and oranges" because "[t]he royalty rate for one patent and the royalty rate for another patent, even in the [semiconductor] industry, can vary tremendously based on the value of the patent and the applications involved"). Clearly, RDRAM, with the *same* technologies at issue in this case, offers a superior point of comparison than the disparate semiconductor technologies cited by Rambus.

[122] *See* RDRAM licenses included in the record – CX 1592 (Samsung); CX 1600 (Hyundai); CX 1609 (Mitsubishi); CX 1612 (Amendment to Hyundai); CX 1617 (Siemens); CX 1646 (Micron); RX 538 (NEC).

[123] Although Commissioner Rosch's dissenting opinion correctly notes that *initial* royalty rates set by the RDRAM licenses sometimes were higher, SDRAM and DDR SDRAM have been high-volume products for several years. *See* Rapp Tr. 10248-49; CX 2112 at 310-11 (deposition transcript at 309-10) (Mooring FTC Dep.) (*in camera*). Our goal – restoring competition – thus requires that we look to the royalties that the RDRAM licenses required for the later years in the life of a high-volume product.

after shipment of the 500,000th unit, provided that more than 10 million units had been shipped.[124]

Rambus argues that 2% was its "standard rate" for RDRAM licenses, and that even this standard rate was an introductory, promotional rate reflecting an investment in the future. However, the 1-2% average RDRAM rate is corroborated by a November 1998 e-mail by Rambus CEO Geoff Tate (observing that three DRAM companies were "at 1% long term" and expressing the hope of *raising* their long-term rates to join three other "biggies" at 1.5%)[125] and by a November 2000 Rambus slide presented by Tate that reflects the company's desire to "drive royalties from *1-2% average* to 3-5%".[126] These documents not only confirm the 1-2% average,[127] but reveal that that average held steady for the long term, not just for an introductory period as Rambus claims. Indeed, four alternative Rambus projections all assume RDRAM royalties of **[redacted]** on DRAM chips for each year from **[redacted]**.[128]

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[124] CX 1592 at 23.

[125] CX 1057.

[126] CX 1391A at 33 (emphasis added).

[127] *See also* CX 1751 (*in camera*), a 1997 Rambus compilation in Rambus Vice President for Intellectual Property Joel Karp's notebook, showing high-volume RDRAM rates **[redacted redacted]**.

[128] *See* CX 527-30 (*in camera*) (identified in the Joint Exhibit List as "Rambus spreadsheet re: 2000-2005 Royalty scenarios"). Rambus also argues that RDRAM rates were artificially constrained because an agreement giving Intel any proceeds from RDRAM licenses in excess of 2% eliminated any incentive for Rambus to negotiate for a higher royalty rate. *See* RBR at 22. For present purposes, however, the important point is that Rambus was unable to achieve even a 2% royalty across the

In making the required "discriminating judgment reflecting [our] ultimate appraisal of all pertinent factors in the context of the credible evidence,"[129] we must consider several factors, each of which points to a reasonable royalty rate lower than the typical RDRAM royalty. First, Rambus's RDRAM licenses covered substantially more technologies than those relevant here;[130] consequently, the royalties that Rambus collected for RDRAM provide too high an estimate of a reasonable royalty for just a subset of the RDRAM technologies.[131] Second, RDRAM royalty rates typically declined substantially for high volumes and with the passage of time; for Samsung, a

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market – many licensees negotiated rates below that level for high-volumes and out-years. *See* Op. at 115 n.624. The alleged arrangement with Intel would not explain why Rambus licensed RDRAM for less than 2%.

[129] *Georgia Pacific*, 318 F. Supp. 1116 at 1120-21.

[130] *See, e.g.*, Farmwald, Tr. 8115-18, 8270, 8275-77; Horowitz, Tr. 8619-25, 8646-47; RX 81 at 6-14; CX 1451. Indeed, Rambus has argued that "RDRAM technology in the early 1990s included numerous inventions," Rambus Response to Complaint Counsel's Finding of Fact No. 717 at 282, and Rambus has criticized Complaint Counsel for suggesting that a change from the four patented technologies in DDR SDRAM would require "anywhere near the magnitude of change required for the industry to switch to RDRAM" or "anywhere near the time involved" for switching to RDRAM. *See* Rambus Response to Complaint Counsel's Proposed Findings of Fact No. 2557 at 1032-1033, No. 2564 at 1037 (describing RDRAM as "an entirely new DRAM architecture").

[131] In terms of the criterion that both parties would apply, the additional technologies included in RDRAM licenses would have increased "the amount that the industry participants would have been willing to pay to use [RDRAM] over its next best alternative" and hence would have increased its *ex ante* value. *See supra* note 106 and accompanying text.

significant DRAM producer,[132] the rates ultimately declined all the way to zero. Given the success of SDRAM and DDR SDRAM and the years that have passed since their introduction, we must take full account of the pattern of discounts specified in RDRAM licenses for high volumes and out-year production. Third, there is substantial evidence that market participants viewed the RDRAM royalties as too high for RDRAM to achieve a major presence in the market. For example, Intel regarded a royalty of less than .5% as appropriate for commodity RDRAM,[133] and JEDEC JC-42.3 subcommittee minutes from March 1997 reflect broad-based misgivings regarding RDRAM royalty rates.[134] Again, a rate below the RDRAM royalty range is appropriate for market-dominating products such as SDRAM and DDR SDRAM.[135] Finally, because it is Rambus's own unlawful conduct that prevents perfect replication of the "but for" licensing picture, plausible doubts

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[132] *See* CX 1057 (e-mail from Rambus CEO Tate describing Samsung as one of the "biggies").

[133] *See* CX 952; CX 961.

[134] *See* JX 36 at 7 ("Some Committee members did not feel that the Rambus [RDRAM] patent license fee fit the JEDEC requirement of being reasonable.").

[135] One Rambus document, CX 960, reflects Rambus CEO Tate's insistence that royalties on infringing DRAMs exceed royalties on RDRAM. By its terms, the document deals with a license of "all of our present and future patents for use for any infringing dram," a substantially more extensive license than at issue here. In any case, Tate's statement came in 1997, when Rambus was still pursuing its hold-up strategy. *See* Op. at 47. Rambus's preferences when hold-up was in the offing are not good evidence of royalties achievable in a "but for" world in which *ex ante* disclosure had occurred.

should be resolved against Rambus.[136] Together, these factors point to a reasonable royalty substantially below the 1-2% RDRAM range.

On the other hand, RDRAM licenses, in addition to requiring per-unit royalties, obligated licensees to make up-front, lump-sum payments of licensing fees.[137] We deem it appropriate to trade off compensation payable up-front and compensation based on future usage, with an increase in one compensating for a decrease in the other. For purposes of our remedial Order, we couch Rambus's compensation entirely in terms of per-unit royalties, with no up-front licensing fees. Although we have accounted for up-front licensing fees by increasing slightly our estimate of the maximum royalty rates consistent with restoring competition, our remedy's coverage of a substantially shorter period than the RDRAM licenses and its exemption of a substantial portion of Rambus's JEDEC-compliant business, suggest that the adjustment should be small.[138]

Thus, starting at 1% – apart from the Samsung arrangement, the lower end of the RDRAM licensing range – and accounting for the factors presented above, we find that a maximum royalty rate of .5%

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[136] 3 AREEDA, ANTITRUST LAW ¶ 653c.

[137] RDRAM licenses required up-front license fees ranging from $1.25 million (CX 1646 at 10-11, 20) to $5.5 million (CX 1617 at 11, Siemens license) for use of Rambus technology in DRAMs.

[138] The RDRAM licenses ran (or were renewable without additional license fees) for the life of Rambus's patents. *See, e.g.*, CX 1592 at 31; CX 1600 at 17; CX 1609 at 15; CX 1617 at 16; CX 1646 at 17; RX 538 at 33. The RDRAM licenses contained no limitation comparable to our remedy's exclusion of DDR2 SDRAM.

for DDR SDRAM, for three years from the date the Commission's Order is issued and then going to zero, is reasonable and appropriate.[139] We also find that a

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[139] Complaint Counsel suggest that appropriate downward adjustments to RDRAM royalties yield a royalty rate of 0.1%, but it is not clear what assumptions they have made to support this calculation. Further, we cannot accept Complaint Counsel's arguments in favor of a maximum royalty rate of 0.25% or less drawn from extrapolations from terms of known or reported Rambus agreements with Samsung and Infineon. Neither the agreements nor the facts on which Complaint Counsel premise their extrapolations are in the record, and in each instance cited Rambus was at the most disadvantageous stage of its infringement litigation – *i.e.*, when it had lost its case at the trial court level.

Rambus, on the other hand, argues that it should be allowed to charge a royalty rate in excess of 2.5% – the rate agreed to in the "other DRAM" clause of the 1995 Hyundai-Rambus license agreement. RBR at 17-18. This is hardly a realistic estimate of reasonable royalty rates in the "but for" world: the Hyundai rate was not accepted by anyone other than Hyundai, and, at least according to Rambus, it was not even retained by that firm. *See* CX 1878 (Rambus answer and counterclaim alleging infringement by Hyundai for using Rambus technologies in JEDEC-compliant products); Hynix Semiconductor Inc. v. Rambus Inc., 2006 WL 565893 at *3-4 (N.D. Cal. 2006) (finding of fact describing Rambus position that the "other DRAM" provision has been superseded and no longer is in effect). Thus, from a market perspective, the Hyundai rate was neither broadly accepted nor sustained. Moreover, the 2.5% figure may have been inflated as a result of trade-offs with other aspects of the license. For example, Rambus's SDRAM and DDR/SDRAM licenses normally include up-front licensing fees of $3 million, and Rambus RDRAM licenses required licensing fees varying from $1.25 million to $5.5 million. The Hyundai license, CX 1600 at 11, conferred a license for purposes of RDRAM memories for a licensing fee of $2 million, with no additional license fee for rights covering SDRAM and DDR/SDRAM – so that Hyundai received its SDRAM and DDR/SDRAM license without having to make the normal $3 million up-front pay-

corresponding .25% maximum rate for SDRAM is appropriate. Halving the DDR SDRAM rate reflects the fact that SDRAM utilizes only two of the relevant Rambus technologies, whereas DDR SDRAM uses four.[140] Moreover, Rambus's quality-adjusted cost comparison data indicate that alternatives to its two SDRAM technologies would add *less than half* the cost of alternatives to the four Rambus technologies in DDR SDRAM.[141] Applying Rambus's own cost figures to Rambus's own analytical paradigm – which looks to "the amount that the industry participants would have been willing to pay to use a technology over its next best alternative"[142] – we find the .25% maximum rate for SDRAM to be both reasonable and fully supported. As with DDR SDRAM, this maximum rate would go to zero three years after the date the Commission's Order is issued.

It is true that we cannot calculate to the penny the downward adjustment from 1%. Yet these royalties certainly are within the range of reasonableness in approximating the result drawn from what we know of the *ex ante* negotiating positions of Rambus and the other JEDEC members. The royalty rates take account of the relevant parties' preferences (*i.e.*,

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ment. Similarly, there may have been trade-offs between the royalties payable by Hyundai for various uses of RDRAM technologies (and the dates and volume levels specified for setting those royalty rates) and the 2.5% royalty payable by Hyundai on other DRAMs. Such trade-offs, within a single license agreement, could have affected the "other DRAM" rate.

[140] Op. at 9-12; CX 1363 at 3.

[141] Rapp, Tr. 9832, 9852. The Commission has questioned the accuracy of Rambus's cost data, but we have not suggested that this relationship is invalid. Op. at 95 n.532-33.

[142] RBR at 12.

JEDEC's cost-sensitivity and preference for open, patent-free standards on the one hand, and Rambus's disinclination to agree to RAND terms on the other hand). They reflect appropriate downward adjustments from the prevailing RDRAM rates based on the nature and extent of the technology at issue, and prevent Rambus from benefitting from the uncertainty that its unlawful actions generated. They also follow the negotiated RDRAM agreements pursuant to which the applicable royalty rate declined over time.[143] Setting a maximum royalty rate that is applicable for a period of three years before dropping to zero follows from the Samsung RDRAM agreement in particular; lends temporal and rate certainty to this remedy; and requires that the royalty rate decline to zero before the relevant patents expire, according to Complaint Counsel, in 2010.

The Commission also must determine an appropriate maximum royalty rate for memory controllers and other components that use the relevant Rambus technologies in complying with JEDEC's SDRAM and DDR SDRAM standards. The RDRAM licenses in the record, cited above, either set a royalty of between 3% and 5% (but 2 to 3% for NEC[144]) for the use of Rambus technologies in memory controllers, microprocessors, and other non-DRAM components, or they leave the rates open for future negotiation, generally specifying a maximum of between 3% and 5%. That is more than double the large-volume royalties for DRAMs. The SDRAM licenses charge **[redacted]** for the DRAM and **[redacted]** for the SDR Controllers; the DDR SDRAM licenses charge

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[143] *See, e.g.*, CX 1592; CX 1600; CX 1609; CX 1612.

[144] *See* RX 538 at 22.

less [redacted] for the DRAMs and **[redacted]** for the DDR Controllers.[145] In addition, the record contains several exhibits that appear to provide Rambus's internal revenue projections based on anticipated royalties and licensing fees. In each, the stated royalty rate for RDRAM Controllers is **[redacted]**, exactly **[redacted]** that for RDRAM devices.[146]

Based on this evidence, we adopt a coefficient of two for determining the maximum royalty rate for memory controllers and other non-memory-chip components that use the relevant Rambus technologies. For such products compliant with the SDRAM standard, this yields a maximum royalty of .5%, dropping to zero after three years; for such products compliant with the DDR SDRAM standard, this yields a maximum royalty of 1%, again dropping to zero after three years.

We also find it appropriate to define the scope of Rambus royalties when products such as memory controllers become integrated into larger products.[147]

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[145] The SDRAM/DDR SDRAM licenses define "Controllers" broadly to include **[redacted redacted redacted]**. *See, e.g.*, CX 1680 at 22 (*in camera*); CX 1681 at 7 (*in camera*); CX 1687 at 6-7 (*in camera*). Although the licenses in the record involve firms known as DRAM manufacturers, several of those licenses identify specific products of the licensees that pursuant to the licenses qualify, and give rise to royalties, as Controllers. *See, e.g.*, CX 1681 at 7, 34 (*in camera*) (Hitachi license identifying approximately **[redacted]** Hitachi products as SDR and DDR Controllers); CX 1685 at 6 (*in camera*) (NEC license identifying **[redacted]** NEC products as SDR Controllers); CX 1689 at 6 (*in camera*) (Mitsubishi license identifying in **[redacted]** Mitsubishi products as SDR Controllers).

[146] *See* CX 527-30 (*in camera*).

[147] *See* CCBR at 15.

Absent some limitation, our remedy could have unintended consequences if product integration were to markedly raise the selling price of the unit subject to the percentage royalty. This is best avoided by articulating a rule that specifies controller royalties in terms of dollars per unit, based on historical experience. Using terms derived from existing RDRAM licenses, our Order limits Rambus to the controller royalties per unit that would result from applying the .5% or 1% royalty rate to the average net sales per unit for SDR Controllers and DDR Controllers, respectively, **[redacted [redacted redacted redacted]**. Such an approach places a cap on these royalties consistent with historical experience and based on reported and verifiable information.[148]

Rambus points out that its RDRAM licenses entailed long-run, co-development efforts with licensees and argues for further compensation on that basis.[149] Given the importance that SDRAM and DDR SDRAM achieved in the market, and the retention of Rambus technologies in DDR2 SDRAM, Rambus already has largely secured the outcome sought by licensees' support without the *ex ante* risk that those efforts might fail.[150] No adjustment on this account appears necessary.

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[148] *See, e.g.*, CX 1687 at 29 (showing licensees' **[redacted]** requirements) (*in camera*).

[149] RBR at 22.

[150] The RDRAM licenses also imposed corresponding duties on Rambus to ensure full technology transfer. *See, e.g.*, CX 1592 at 19-21 (Samsung license stating Rambus technology transfer obligations); CX 1646 at 8-10 (Micron license stating Rambus technology transfer obligations). These obligations would be

Rambus's RDRAM licenses provided additional compensation in the form of non-exclusive cross licenses and grant-backs.[151] These provisions, however, typically were limited to (i) patented technologies that would block Rambus from using its proprietary RDRAM technologies, and (ii) the licensee's improvements on RDRAM technologies.[152] Given the limited nature of these terms, and subject to those limitations, we will permit Rambus to include comparable provisions in any SDRAM/DDR SDRAM licenses entered under the Commission's remedial Order.

IV.

A.

As discussed above, the Commission has "wide latitude for judgment" in selecting a remedy, subject to the constraint that it must be reasonably related to the violation.[153] Furthermore, the Commission is not limited to merely proscribing unlawful conduct "in the precise form in which it [was] found to have existed in the past."[154] The Commission is authorized to both prohibit the practices that it has found unlawful and – in order to prevent future unlawful conduct – to "fence-in" the violator with provisions

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unnecessary given the long-established nature of the SDRAM and DDR SDRAM standards.

[151] *See, e.g.*, CX 1600 at 16; CX 1609 at 14; CX 1646 at 15.

[152] *See* CX 1600 at 4-5; CX 1609 at 3-4; CX 1646 at 4.

[153] *Jacob Siegel Co.*, 327 U.S. at 612-13; *see* FTC v. Nat'l Lead Co., 352 U.S. at 428; *Ruberoid Co.*, 343 U.S. at 473.

[154] *Colgate-Palmolive Co.*, 380 U.S. at 395 (quoting *Ruberoid Co.*, 343 U.S. at 473).

that are broader in scope.[155] So long as the remedy has a reasonable relationship to the violation that the Commission has found, the Commission may "close all roads to the prohibited goal," including proscribing conduct that is lawful.[156]

As we explained most recently in *Telebrands Corp.*,[157] in determining the appropriate scope of fencing-in relief, the Commission considers three factors: (1) the seriousness and deliberateness of the violation; (2) the ease with which the violation may be transferred to other products; and (3) whether the respondent has a history of prior violations. No single factor is determinative, but "the more egregious the facts with respect to a single element, the less important is it that another negative factor be present."[158]

We find that Rambus's intentional and willful deception,[159] described in detail in the Commission's liability opinion, is sufficient, without more, to justify broad fencing-in relief. Furthermore, factors such as Rambus's large portfolio of intellectual property and the company's status as a developer and licensor of

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[155] *See, e.g., Colgate-Palmolive Co.*, 380 U.S. at 395; Kraft, Inc. v. FTC, 970 F.2d 311, 326-27 (7th Cir. 1992).

[156] *Ruberoid Co.*, 353 U.S. at 473.

[157] Telebrands Corp., 140 F.T.C. 278, 334 (2005), *available at* http://www.ftc.gov/os/decisions/docs/volume140.pdf, *aff'd*, 477 F.3d 354 (4th Cir. 2006).

[158] Sears, Roebuck & Co. v. FTC, 676 F.2d 385, 392 (9th Cir. 1982).

[159] In our liability opinion, we found that Rambus's deceptive course of conduct was "intentionally pursued," Op. at 51, and that Rambus "intentionally and willfully engaged in deceptive conduct." Op. at 68.

memory technologies (but not a manufacturer) could increase the incentive for Rambus to attempt to circumvent the Commission's Order. Given these circumstances, we believe that merely prohibiting Rambus from "knowingly" engaging in a deceptive course of conduct as a member of an SSO – as Rambus proposes – would provide inadequate incentive for it to put into place the procedures and policies that are necessary to ensure that its future participation in SSOs is conducted in an honest and forthright manner and that it does not simply circumvent the Commission's Order. The Order provisions described below represent the Commission's efforts to prohibit Rambus from engaging in the practices that we found in our liability opinion to violate Section 5 of the FTC Act, as well as to prevent future related conduct.

B.

Paragraph II of the Commission's Order prohibits Rambus from making any misrepresentations concerning its patents, or applications for patents, to any SSO, or its members, and constrains Rambus from taking any action, or refraining from taking any action, that would lead the SSO, or any of its members, to unknowingly infringe any current or future Rambus patent. Additionally, Paragraph II requires Rambus to abide by any requirement or policy of an SSO in which it participates to make complete, accurate, and timely disclosures. These prohibitions are substantially the same as those set forth in Rambus's proposed order, but the scope of our Order is drawn more broadly to protect the public against a repetition of the same deceptive conduct with respect to other products.

Paragraph III of the Order requires Rambus to employ a compliance officer, who shall be responsible for communicating Rambus's intellectual property rights relating to any standard that is under consideration by an SSO in which Rambus participates. The compliance officer shall also be responsible for verifying the contents of Rambus's periodic reports to the Commission, and to supplement such reports when it is necessary to provide a complete and accurate picture of the status of Rambus's compliance with the terms of this Order. We believe that such a provision is necessary and appropriate to ensure that Rambus will adhere to SSO rules and policies, and to facilitate the Commission's efforts to monitor its compliance with the instant Order.

Paragraphs IV-VII are designed to restore – to the extent possible – the competitive conditions that would have existed but for Rambus's unlawful conduct. Our remedy covers all technologies used in JEDEC-compliant products and protected by patents derived from applications that Rambus filed while it was a member of JEDEC. Rambus contends that our remedy must be limited to the four technology markets that are identified in the Commission's liability decision.[160] However, claims of infringement based on JEDEC-compliant use of any of these technologies would take advantage of the same deceptive conduct – indeed, the same intentional failure to disclose – identified in the Commission's liability decision.[161] That is, the same violation condemned with regard to the four relevant technologies at issue in the liability decision (programmable CAS latency, program-

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[160] *See* RBR at 9-10.

[161] Op. at 28-68.

able burst length, dual-edge clocking, and on-chip PLL/DLL) could be readily transferred to additional technologies covered by Rambus's undisclosed patent rights.[162] Rambus repeatedly has indicated that it contemplates seeking infringement rulings against JEDEC-compliant uses of technologies other than the four at issue in the liability decision.[163]

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[162] This would include both patents derived from Rambus's original '898 application and those derived from any other applications filed by Rambus prior to its withdrawal from JEDEC. Rambus was hard at work during the period of its JEDEC membership to obtain patent rights on technologies other than those directly at issue in the liability opinion. *See, e.g.*, CX 1949 at 5, CX 711 at 58, and Crisp, Tr. 3247-48 (all relating to source synchronous clocking); CX 1932, CX 3125 at 279-80, (Vincent *Infineon* Dep.) (*in camera*), CX 3126 at 448-52 (Vincent *Infineon* Dep.) (*in camera*), CX 1963 at 4, and Crisp, Tr. 3046 (all relating to low voltage swing signaling); CX 702, CX 734 at 1, CX 1949 at 1, and Crisp, Tr. 3097-99 (all relating to multi-bank technologies); CX 734 at 1 and, CX 738 (both relating to auto precharge technology); CX 691 and Crisp, Tr. at 3190-91 (both relating to externally supplied reference voltage).

[163] *See, e.g.*, CX 1888 (May 2001 Rambus press release noting that "the Virginia case against Infineon [in which the trial court had dismissed infringement claims] involve[d] only four Rambus U.S. patents" but that "Rambus holds newly issued U.S. and European patents covering Rambus inventions used by SDRAMs and DDR SDRAMs that have not yet been asserted in any litigation and are not impacted by the [Infineon] Court's decision"); CX 1403 at 30 (July 2001 Rambus Presentation stating, "Virginia decision involved only 4 patents; we have many others which are used by SDRAM/DDR."); CX 1371 at 5 (April 2000 Rambus patent licensing presentation to nVIDIA listing numerous alleged "Rambus Innovations" involving technologies beyond the four specifically at issue in the liability decision); CX 1383 at 4 (September 2000 Rambus patent licensing presentation to ATI listing numerous alleged "Rambus Innovations" involving technologies other than the four specifically at issue in the liability decision); CX 1363 at 3 (January

Consequently, coverage of all technologies used in JEDEC-compliant products and protected by patents derived from applications filed while Rambus was a member of JEDEC is necessary as fencing-in, in order to "effectively close all roads to the prohibited goal, so that [the Commission's] order may not be by-passed with impunity."[164]

Paragraph IV prohibits Rambus from collecting royalties relating to the sale, manufacture or use of any JEDEC-Compliant DRAM or Non-DRAM Products that are greater than those that Rambus is allowed to collect under the terms of the present Order. The purpose of this provision -- which applies both to U.S. patents and, with respect to imports or exports to or from the United States, to foreign

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2000 Rambus presentation claiming that DDR SDRAM used a patented Rambus innovation involving "two bit prefetch architecture" as well as alleged Rambus innovations involving two external clocks, low voltage signaling, quadrature data alignment and source synchronous signaling).

[164] *See Ruberoid*, 343 U.S. at 473. *New York v. Microsoft*, 224 F. Supp. 2d 76 (D.D.C. 2002), relied upon by Rambus, RRBR at 7, is fully consistent. In that case, the court shaped its remedy to ensure that Microsoft's exclusionary conduct "broadly" defined was "fully enjoined." *Id.* at 148 (quoting language now appearing in 3 AREEDA, ANTITRUST LAW ¶ 653f at 102-03 (2d ed. 2002)), and stating that in cases involving a monopolist's consummated exclusionary act, "equitable relief beyond a mere injunction against repetition of the act is generally appropriate" and must be tailored with "sufficient breadth to ensure that a certain 'class' of acts, or acts of a certain type or having a certain effect not be repeated"). The fact that the identical deceptive conduct found in the Commission's liability opinion also infected a broader range of technologies makes these fencing-in principles wholly apposite here.

patents[165] – is to preclude Rambus from continuing to collect monopoly rents with respect to JEDEC-Compliant DRAM or Non-DRAM Products. Paragraph V requires Rambus to make available a worldwide,

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[165] The global nature of the DRAM industry requires that our remedy reach Rambus's enforcement of foreign patent rights with respect to imports and exports to and from the United States. DRAMs often are manufactured abroad, *see, e.g.*, Bechtelsheim, Tr. 5886; Appleton, Tr. 6267; CX 2107 at 15-16, 18-20 (Oh FTC Dep.) (*in camera*), and even when manufacturing occurs in the United States, some steps in the processing frequently take place abroad. *See* Appleton, Tr 6268-70; CX 2107 at 19-20 (Oh FTC Dep.) (*in camera*). Moreover, major DRAM customers often incorporate DRAM chips into their products at foreign manufacturing facilities. *See* Bechtelsheim, Tr. 5886; Appleton, Tr. 6273-74. Because of the geographically dispersed nature of these activities, Rambus could use its foreign patents to collect royalties that would undermine a remedy confined to U.S. patents. *See* McAfee, Tr. 7521.

Although Rambus argues that the Commission lacks authority to extend its remedy to foreign patent rights, it cites no relevant support. RB at 133. For example, *Western Electric Co. v. Milgo Electronic Corp.*, 450 F. Supp. 835, 837 (S.D. Fla. 1978), actually ruled that the court possessed "the power to enjoin a party over whom it ha[d] personal jurisdiction from pursuing [patent] litigation before a foreign tribunal." The Commission's remedy similarly would constrain the patent enforcement efforts of a party over which it has personal jurisdiction. Medtronic, Inc. v. Catalyst Research Corp., 518 F. Supp. 946, 955 (D. Minn. 1981), *aff'd*, 664 F.2d 660 (8th Cir. 1981), supports the proposition that because U.S. and foreign patents confer distinct rights, parties cannot obtain injunctions against foreign claims on the basis of validity and infringement rulings regarding U.S. patents. The Commission's remedy, however does not affect determinations of validity or infringement. Like the *Medtronic* court, which went on to preliminarily enjoin the defendant from pursuing patent enforcement activities abroad, 518 F. Supp. at 956, the Commission's remedy governs only the actions of Rambus.

nonexclusive license – under the relevant U.S. patents only – to make, use, and sell JEDEC-compliant DRAM and non-DRAM products at rates that do not exceed the Maximum Allowable Royalty Rates, as defined and set forth in Paragraph I. To ensure that the Commission's efforts to restore competition are not undermined by the threat of patent infringement litigation, Paragraphs VI and VII prohibit Rambus from enforcing the royalty agreements that would be prohibited by the terms of the instant Order.

Paragraphs VIII through XI contain ancillary provisions that are designed to help the Commission oversee Rambus's compliance with this Order. Rambus is required, for example, to distribute copies of the Commission's Order, make periodic compliance reports to the Commission, and provide the Commission with access to its documents.

Finally, paragraph XII specifies that the Order will sunset in 20 years. As we noted in *Kentucky Household Goods Carriers Association*,[166] a 20-year sunset provision is common to most of the Commission's orders. Respondent, of course, may seek to modify or set aside the Order, pursuant to Section 2.51 of the Commission's Rules of Practice,[167] if at any time prior to the expiration of 20 years it is no longer in the public interest.

C.

We do not believe that the Commission's remedy should extend to Rambus's patents used in products that are compliant with JEDEC's DDR2 SDRAM or

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[166] 139 F.T.C. 420, 434 (2005), *available at* http://www.ftc.gov/os/decisions/docs/volume139.pdf (June 21, 2005).

[167] 16 C.F.R. § 2.51.

succeeding generations of JEDEC standards. There is no doubt that some relationship exists between Rambus's deceptive conduct and its position in the DDR2 SDRAM market. Nevertheless, in our liability decision, we concluded that Complaint Counsel had not proved a sufficient causal link between Rambus's deceptive course of conduct and the DDR2 standard and, indeed, between the issuance of the SDRAM and DDR SDRAM standards and the DDR2 standard (because there was insufficient evidence of lock in).[168] Absent a sufficient causal link, extending our remedy to cover DDR2 SDRAM would not restore competition lost because of Rambus's deceptive conduct. Nor do we believe that "fencing in" justifies extending our remedy to the DDR2 standard (or subsequent generations of JEDEC DRAM standards) under these circumstances. Indeed, absent the necessary causal links, applying our remedy to DDR2 SDRAM could conflict with the warnings in *Jacob Siegel, National Lead,* and *Ruberoid*, discussed above, that the Commission cannot issue an order that is not sufficiently related to the violation.

Commissioner Harbour's dissent emphasizes that the relief ordered – confined to products compliant with JEDEC's SDRAM and DDR SDRAM standards but not reaching products compliant with JEDEC's DDR2 SDRAM standard – will have declining impact as the market progressively shifts to DDR2. This follows not from any policy choice, but rather from the timing of underlying events. Rambus revealed its patents well before the DDR2 SDRAM standard was set, and we were unable to conclude in our liability opinion that in the relevant time frame lock in

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[168] Op. at 110, 114.

conferred durable monopoly power over DDR2.[169] Had the evidence demonstrated a sufficient causal link between Rambus's deceptive conduct and JEDEC's standardization of Rambus technologies in DDR2 SDRAM, our relief would have covered products compliant with that standard. The evidence, however, does not carry us that far, and we limit our order accordingly.

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[169] Op. at 110-14.

In the Matter of Rambus, Inc.

Docket No. 9302

Remedy Statement of Commissioner Pamela Jones Harbour Concurring in Part and Dissenting in Part[1]

I join Parts I, II, IV.A., and (subject to the exception described below) IV.B. of the majority's remedy opinion. In particular, I strongly agree that the Commission's remedial authority in Section 2 cases extends beyond narrowly constrained cease-and-desist orders and includes the ability to order compulsory, royalty-free licensing.

Along with Commissioner Rosch, I dissent from Part III of the majority opinion and the above-zero royalty rate licensing provisions described in Part IV.B. of the majority opinion (and also from the Order, to the extent it is based on those portions of the majority opinion), because I believe the Commission should have imposed a royalty-free remedy in this case. With one exception, I join Commissioner Rosch's dissenting statement, and I elaborate further in Part I below.

As explained in Part II below, and unlike Commissioner Rosch, I also dissent from Part IV.C. of the majority opinion. I do not believe the remedy adopted by the majority goes far enough to restore competition. Given the Commission's remedial authority and the current "actual market realities"[2] for SDRAM

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[1] This opinion uses the same abbreviations used in the majority's opinion on remedy [hereinafter Majority Remedy Opinion]

[2] *See* Eastman Kodak Co. v. Image Tech. Servs., Inc., 504 U.S. 451, 466-67 (1992) ("Legal presumptions that rest on formalistic

technologies, the Commission can and should impose a remedy reaching the DDR2 generation of SDRAM. A remedy extending to DDR2 would be a legitimate and appropriate exercise of the Commission's remedial discretion.

I. THE REMEDY SHOULD BE ROYALTY-FREE

All five Commissioners agree that the Commission has the authority to require royalty-free licensing under certain circumstances.[3] Commissioner Rosch sets forth compelling arguments why the Commission should exercise that authority in this case. I write separately to highlight one key reason why I concur with Commissioner Rosch on this point: Rambus's argument for an above-zero royalty rate is premised on a flawed logical construct regarding the incentives of Rambus and other JEDEC members in a plausible "but for" world.

Rambus would have us believe that – if faced with a choice between collecting RAND royalties or no royalties at all – Rambus would have offered JEDEC a RAND commitment, in order to entice JEDEC to adopt Rambus technologies as part of the SDRAM standards.[4] Based on the record before us, I cannot agree.

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distinctions rather than actual market realities are generally disfavored in antitrust law.").

[3] Majority Remedy Opinion at II.A.-B.; Dissenting Statement of Commissioner J. Thomas Rosch [hereinafter Rosch Remedy Dissent].

[4] RBR at 3, 10-12 & n.9; RRBR at 10-11.

As noted by Commissioner Rosch in his dissenting statement,[5] RDRAM was Rambus's flagship technology. In its unanimous liability opinion, the Commission found that Rambus's goal was the adoption of its proprietary RDRAM technology as the *de facto* industry standard.[6] The Commission also found that a primary objective of the JEDEC standard-setting process was to establish a royalty-free alternative to RDRAM. The industry resisted RDRAM precisely because of the high royalties Rambus was expected to charge,[7] in keeping with the company's business model of earning its revenue through patent licensing.[8]

If Rambus had decided to offer a RAND commitment to JEDEC, presumably Rambus would have offered something less than the full package of technology comprising RDRAM, because Rambus would have wanted to continue to push for industry adoption of RDRAM. Rambus also would have known that its RAND rates for this package of technology must

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[5] Rosch Remedy Dissent at 8.

[6] Rambus Liability Opinion at 8.

[7] *See, e.g.*, CX 961 at 1 (quoting a September 1997 Intel e-mail to Rambus Chief Executive Officer, expressing concern that "absolute cost is the critical factor" at least for the low end of the market and warning that, upon analyzing the royalty obligations attached to RDRAM, the industry would develop alternatives).

[8] *See* Rambus Liability Opinion at 7 ("Rambus develops, secures patents on, and licenses technologies to companies that manufacture semiconductor memory devices. Rambus is not a manufacturing company; rather, Rambus earns its revenue through the licensing of its patents.") (citations omitted); CX 2106 (Farmwald FTC Dep.) at 220 (*in camera*) ("[r]oyalties are the lifeblood of Rambus"); *see also* Rosch Remedy Dissent, notes 29-30 and accompanying text.

be proportional to the anticipated cost of alternative technologies under consideration by JEDEC, or else the RAND commitment would not be an attractive proposition to manufacturers of DRAM components. The RAND rates for this technology package, however, would have represented a significant discount off of the RDRAM rates Rambus was expected to charge. As a result, manufacturers would have been able to forgo the pricier RDRAM standard, yet still license some portion of Rambus's DRAM technology – at the discounted RAND rates – for incorporation into rival JEDEC-compliant devices. But this outcome would have been fundamentally inconsistent with the Rambus business model, because it would have reduced even further the industry's incentives to adopt RDRAM as a *de facto* standard. Therefore, it is difficult to conclude on this record that Rambus would have offered RAND terms in a plausible "but for"world.

Even if we were to suppose, nevertheless, that Rambus would have offered a RAND commitment, the inquiry cannot end there. We must ask, as well, how the JEDEC members would have responded. Again, based on the record before us, it is implausible to conclude that the JEDEC members would have accepted Rambus's RAND offer and incorporated Rambus technology into the JEDEC standards. The record demonstrates that JEDEC members not only were wary of adopting patented technology generally, but also went out of their way to avoid Rambus's patented technology specifically.[9]

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[9] *See, e.g.*, Rambus Liability Opinion at 74 & n.403 ("Indeed, the one time that JEDEC members had advance knowledge that a Rambus patent was likely to cover a standard under consid-

Moreover, as the Commission's unanimous liability opinion explains in detail, the Commission assumes a "but for" world where lock-in had not yet occurred and where viable, cost-effective alternative technologies were available to JEDEC[10] – all the more reason why the JEDEC members likely would have rejected a RAND offer by Rambus in a plausible "but for" world.[11]

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eration, the members took deliberate steps to avoid standardizing the Rambus technology."); Rosch Remedy Dissent at II.C.

[10] *See, e.g.*, Rambus Liability Opinion at 76 ("Alternative technologies were available when JEDEC chose the Rambus technologies, and could have been substituted for the Rambus technologies had Rambus disclosed its patent position."), 82 ("We find that the evidence does not establish that Rambus's technologies were superior to all alternatives on a cost/performance basis."), 97-98 ("No matter what the specific outcome might have been [if Rambus had disclosed its patent position], the consequences of incorporating Rambus's patented technologies into the standards would have been identified and weighed *before* the standards were adopted, *when Rambus's technologies were competing with the alternatives*. That 'but for world' would have been more competitive than the current DRAM marketplace, in which Rambus has monopoly power and can charge whatever royalties it chooses.") (emphasis in original).

[11] *See* Rambus Liability Opinion at 63-65 (various industry participants believed that the JEDEC standards under consideration would be Rambus-free and royalty-free). Their beliefs were consistent with Rambus's behavior, in light of the Commission's findings regarding Rambus's course of exclusionary conduct. The Commission found that Rambus's business strategy included amending its patent applications to cover JEDEC-compliant products, based on information gleaned during Rambus's participation in JEDEC while the standards were under development. *Id.* at 4 ("through its participation in JEDEC, Rambus gained information about the pending standard, and then amended its patent applications to ensure that subsequently-issued patents would cover the ultimate standard"), 40-

II. THE REMEDY SHOULD EXTEND TO DDR2

All of the other Commissioners have chosen to limit the scope of the remedy to the SDRAM and DDR SDRAM standards. The Commission's unanimous liability opinion found lock-in only with respect to the two earlier standards; therefore, my colleagues conclude, the remedy should go no further. I disagree.

When the Commission fashions a remedy, it should strive to restore, as completely as possible, the competitive environment that would have existed in the "but for" world.[12] In this case, the Commission can and should impose a remedy that would apply to technologies included in all JEDEC standards that were developed, *or in development*, at the time Rambus began enforcing its patents. This test would yield a remedy covering DDR2 (but not DDR3 or successive generations).

This formulation would reflect an appropriate use of fencing-in relief – consistent not only with existing jurisprudence regarding the scope of the Commis-

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48 (detailing the chronology of Rambus's conduct, including relevant amendments), 67 (holding that Rambus's amendment program was deceptive); *see also* CX 837 at 2 (internal email advising Rambus management that the company should "redouble [its] efforts to get the necessary amendments completed, the new claims added and make damn sure this ship is watertight before we get too far out to sea."). It is entirely possible that the JEDEC standards *were* Rambus-free at some point, before Rambus repeatedly amended its patent applications to cover them.

[12] *See* Majority Remedy Opinion at 6 ("[T]he Commission's authority extends to restoring, to the extent possible, the competitive conditions that would have been present absent Rambus's unlawful conduct.").

sion's remedial authority, but also with burden-of-proof requirements during the remedy phase. A DDR2 remedy would more completely and effectively mitigate the likely and foreseeable effects of Rambus's exclusionary conduct and would create an opportunity for the market to establish a competitive equilibrium.

The proposed test also recognizes the need for a clearly articulated limiting principle. The remedy would be purely prospective and reasonably bounded in breadth, yet aggressive enough to prevent Rambus from being unjustly enriched by the lingering effects of its unlawful conduct.

Finally, such a remedy would enhance the deterrent effect of the Commission's enforcement action by sending a forceful message: companies will not be allowed to profit from monopoly power obtained by hijacking a standard-setting organization.

A. The Commission's Liability Opinion Does Not Rule Out The Possibility of DDR2 Lock-In

In its unanimous liability opinion, the Commission held that "[t]he record does not support a finding that lock-in conferred durable monopoly power over DDR2 SDRAM by 2000" – subject to the caveat expressed in footnote 621: "Although we do not, on this record, find durable monopoly power as to DDR2 SDRAM, neither do we rule it out. It is possible that Rambus did, in fact, obtain durable monopoly power over DDR2 SDRAM."[13]

As footnote 621 recognized, the Commission "might have found lock-in with respect to DDR2 SDRAM if the record had demonstrated, for example, that

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[13] Rambus Liability Opinion at 110, 114 & n.621.

backward compatibility concerns were a substantial determinative factor in JEDEC's DDR2 SDRAM standard-setting decisions."[14] For purposes of establishing liability, however, the record was deemed insufficient to make such a finding.

B. The Commission Has The Authority to Reach DDR2

When the Commission finds that the law has been violated, the Commission has three responsibilities: to stop the unlawful conduct; to prevent the unlawful conduct from recurring; and, importantly, to restore competition lost as a result of the unlawful conduct. As the majority opinion explains, the Commission has the authority to order relief that goes beyond a cease and desist order – including the prohibition of otherwise lawful conduct – if such relief is necessary to alleviate competitive harm and prevent future harm from occurring. The Commission is exercising this authority by prescribing maximum royalty rates that Rambus may charge for SDRAM and DDR SDRAM. The same core principles that support the majority's remedial choice also would justify a remedy extending to DDR2.

The Supreme Court in its 1946 *Jacob Siegel* decision described the Commission as "the expert body to determine what remedy is necessary to eliminate the unfair or deceptive trade practices which have been disclosed."[15] As discussed in the majority opinion,[16] the Court further stated that the Commission "has

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[14] *Id.* at 114 n.621.

[15] Jacob Siegel Co. v. FTC, 327 U.S. 608, 612 (1946).

[16] Majority Remedy Opinion at 6-7.

wide latitude for judgment"[17] and "wide discretion in its choice of a remedy deemed adequate to cope with the unlawful practices in . . . trade and commerce."[18] The Court concluded that "the courts will not interfere except where the remedy selected has no *reasonable relation* to the unlawful practices found to exist."[19] The Supreme Court and lower courts consistently have affirmed the breadth of the Commission's remedial authority under Section 5 of the FTC Act.[20]

As the majority opinion explains, the Court repeatedly has upheld the Commission's authority to go beyond a cease and desist order. The Commission may require relief that prohibits otherwise lawful conduct, if such relief is necessary to prevent ongoing harm to competition. As the Court explained in *Ruberoid*,

> the Commission is not limited to prohibiting the illegal practice in the precise form in which it is found to have existed in the past. If the Commission is to attain the objectives Congress envisioned, it cannot be required to confine its road block to the narrow lane the transgressor has traveled; it must be allowed effectively to close all roads to the prohibited goal, so that its order may not be by-passed with impunity.[21]

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[17] *Siegel*, 327 U.S. at 613.

[18] *Id.* at 611.

[19] *Id.* at 613 (emphasis added).

[20] *See, e.g.*, FTC V. Colgate-Palmolive Co., 380 U.S. 374, 392 (1965); FTC v. Nat'l Lead Co., 352 U.S. 419, 428-30 (1957); FTC v. Ruberoid Co., 343 U.S. 470, 473 (1952).

[21] Ruberoid, 343 U.S. at 473.

The Court later gave a name to this concept: "those caught violating the [FTC] Act must expect some fencing in."[22] The Commission – with the approval of the courts – has included a variety of fencing-in provisions in its remedial orders.[23] The Commission may use its fencing-in authority as long as the relief is reasonably related to the illegal conduct and is not punitive.[24]

In this case, extending the relief to the DDR2 SDRAM standard would be reasonably related to Rambus's deceptive and exclusionary conduct. The Commission's unanimous liability opinion found that Rambus's course of deceptive conduct was causally linked to Rambus's acquisition of a monopoly position in technologies used in products compliant with JEDEC's SDRAM and DDR SDRAM standards. By the time Rambus began enforcing its patents against JEDEC-compliant products, the industry already had begun to develop the third-generation SDRAM standard – *i.e.*, DDR2. DDR2 was based on the existing SDRAM and DDR SDRAM standards, reflecting

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[22] *Nat'l Lead*, 352 U.S. at 431.

[23] *See, e.g.*, Litton Industries, Inc. v. FTC, 676 F.2d 364, 370 (9th Cir. 1982) (quoting ITT Continental Baking Co. v. FTC, 532 F.2d 207, 223 (2d Cir. 1976)) (multi-product order to address "all products in a broad category, based on violations involving only a single product or group of products," to prevent respondent from transferring unlawful conduct to other products); Toys "R" Us, Inc., 126 F.T.C. 415, 615 (1998), *aff'd*, 221 F.3d 928, 939-940 (7th Cir. 2000) (respondent enjoined from making certain otherwise lawful requests for information from suppliers, because the requests were "the means used by TRU to implement and police the illegal restraints of trade").

[24] *See* Majority Remedy Opinion at 7 (a compulsory licensing order that attempts to replicate the "but for" world is not punitive).

JEDEC's preference for "evolutionary" progression from one generation to the next. Given the industry's desire for backward compatibility,[25] Rambus reasonably could have anticipated – and would have hoped – that its technologies also would be incorporated into DDR2.

In the "but for" world, the SDRAM and DDR SDRAM standards would have been Rambusfree. Due to the path-dependent nature of JEDEC standard-setting, the inclusion of Rambus technologies in the first- and second-generation standards made it all but inevitable that Rambus technologies also would be included in DDR2. Rambus's exclusionary conduct therefore facilitated the creation of Rambus's DDR2 monopoly. This would satisfy the "reasonable relation" test.

As for the "punitive" prong of the analysis, courts have upheld a variety of fencing-in provisions as not punitive,[26] and a remedy reaching DDR2 also would

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[25] *See* Rambus Liability Opinion at 112 & n.613-14 ("Several industry witnesses expressed concerns that changing DDR2 SDRAM to avoid Rambus's patents would have disrupted backward compatibility. One witness testified that an effort to maintain backward compatibility after eliminating dual-edge clocking would have had 'a big impact' from the perspective of design and that a desire to maintain backward compatibility was the reason that a sub-unit of JEDEC's task group . . . chose to maintain dual-edge clocking.").

[26] The courts have upheld fencing-in provisions that prohibit otherwise lawful conduct, finding that they are not punitive. *See, e.g.*, L.G. Balfour Co. v. FTC, 442 F.2d 1 (7th Cir. 1971) (affirming divestiture order in § 5 case, by implication finding remedy not punitive); Golden Grain Macaroni Co. v. FTC, 472 F. 2d 882 (9th Cir. 1972), *cert. denied*, 412 U.S. 918 (1973) (same); *see also* Curtis Publ'g Co. 78 F.T.C. 1472 (1971) (Commission

pass muster. By extending the remedy to technologies included in all JEDEC standards developed or in development at the time Rambus began enforcing its patents against JEDEC-compliant products, the Commission would do no more than restore the competitive *status quo ante*. Rambus would not be deprived of the entire value of its intellectual property, because Rambus still would have total freedom to enforce its patents with respect to all non-JEDEC-compliant uses (such as RDRAM). True, a royalty-free remedy would "hurt" Rambus more than the remedy endorsed by the majority. But one must be careful not to equate financial pain with excessive punishment. If a remedy is proportional to the underlying offense, it is not punitive, regardless of whether it inflicts pain. In contrast, if a remedy is not proportional to the offense, the Commission's remedial goals are unlikely to be fully achieved. The wrongdoer will benefit; the remedy will not restore the *status quo ante*; and future violations may be encouraged rather than deterred.

C. The Burden Of Proof Must Be Properly Allocated

The Commission's unanimous liability opinion found insufficient proof of a causal linkage between Rambus's exclusionary conduct and its DDR2 monopoly. But the burden of proof in the remedial phase is less stringent than in the liability phase, and the evidence must be weighed accordingly. Finding a "reasonable relation" to the unlawful practices requires less evidence than would be needed to establish the violation.

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required restitution of monopoly profits, describing remedy as prospective only and not punitive).

For remedial purposes, Complaint Counsel should not bear the burden of proving the "but for" world with absolute certainty. Yet, the other Commissioners would limit the Commission's remedial reach to anticompetitive effects directly caused by the unlawful conduct. In effect, therefore, my colleagues seek to restore the "but for" world only to the extent Complaint Counsel has proven what that world would have looked like. I believe their approach incorrectly allocates the burden of proof.

In our liability opinion, the Commission unanimously agreed that, for purposes of establishing Section 5 liability, Complaint Counsel needed to prove a causal relationship between Rambus's unlawful conduct and Rambus's acquisition or maintenance of monopoly power in the relevant technology markets. The Commission found that Complaint Counsel had satisfied its burden with respect to the SDRAM and DDR SDRAM standards, but not with respect to DDR2. Significantly, however, the Commission found *no* proof of *Rambus's* portrayal of the "but for" world. The Commission explicitly rejected Rambus's contention that the JEDEC members would have chosen to include the Rambus technologies in the SDRAM standards, even if Rambus had not engaged in its course of deceptive conduct and JEDEC had full information about Rambus's intellectual property. Moreover, as discussed above, footnote 621 preserved the possibility that Rambus's exclusionary conduct might have been causally linked to Rambus's monopolization of the four relevant technologies with respect to the DDR2 standard.

It is black-letter Supreme Court law that "once the Government has successfully borne the considerable burden of establishing a violation of law, all doubts

as to the remedy are to be resolved in its favor."[27] Areeda and Hovenkamp reflect this principle when they state:

> [T]he monopolist bears the risk of the uncertain consequences created by its exclusionary acts. Thus, at the least, equitable relief properly goes beyond merely "undoing the act"; the proper relief is to eradicate all the consequences of the act and provide deterrence against repetition; and any plausible doubts should be resolved against the monopolist.[28]

As discussed, but not decided, in the Commission's unanimous liability opinion, Rambus intentionally destroyed a large volume of documents, including documents regarding Rambus's participation in JEDEC and Rambus's patent prosecution litigation.[29] While the Commission found it unnecessary to resolve the spoliation issue for purposes of determining liability, Rambus's alleged spoliation of evidence should not be wholly ignored for remedy purposes. Rambus destroyed contemporaneous records that might have corroborated Complaint Counsel's position on remedy. In particular, on July 17, 2000, Rambus Vice President and in-house counsel Neil Steinberg instructed Rambus executives to destroy

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[27] United States v. E.I. DuPont de Nemours & Co., 366 U.S. 316, 334 (1961) (Commission entitled to decree directing complete divestiture in merger case, to remedy violations of Clayton Act § 7), *quoted in* Ford Motor Co. v. United States, 405 U.S. 562, 575 (1972) (upholding divestiture and various other injunctive provisions in Commission order in §7 case).

[28] III PHILLIP E. AREEDA & HERBERT HOVENCAMP, ANTITRUST LAW 653f (2d ed. 2002).

[29] Rambus Liability Opinion at 115-18.

all documents, other than executed contracts, that referred or related to patent licensing negotiations.[30] Clearly, such records would have been particularly relevant to the Commission's consideration of what the real world might have looked like and, thus, what the "but for" world should be. Instead, Rambus's systematic and successful document destruction campaign has enhanced doubts regarding how DDR2 should be treated in the "but for" world.

The proper relief in this case must eradicate all consequences of Rambus's exclusionary conduct. Rambus's monopoly power with respect to DDR2 is reasonably related to Rambus's exclusionary conduct. Because "any plausible doubts" are to be resolved against Rambus – especially doubts exacerbated by Rambus's destruction of documents – the Commission may extend its remedy to DDR2.

D. Marketplace Realities: A DDR2 Remedy Will More Effectively Restore Competition

Enforcement litigation in complex antitrust cases presents an inherent paradox: by the time any remedy is achieved, the market may have moved on. This is especially true in fast-moving technology markets. The *Rambus* case was worthwhile, irrespective of remedial issues, because the Commission's unanimous liability opinion will provide valuable guidance.[31]

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[30] CX 5020 (July 17, 2000 email from Neil Steinberg to "exec"). This directive was issued after Rambus had begun to enforce its patents against DRAM manufacturers and only days before Rambus filed an additional enforcement action against Infineon.

[31] *Cf.* United States v. Microsoft Corp., 253 F.3d 34, 48-49 (D.C. Cir.), *cert. denied*, 534 U.S. 952 (2001):

But having said that – and given that the Commission *can* rightfully reach DDR2 – the Commission *should* do so.

It is impossible to ignore what has happened in the SDRAM marketplace since the Commission voted out its administrative complaint in June 2002. The market is now rapidly migrating to DDR2. Therefore, the Commission's remedial order applies only to products that soon will be obsolete. A quick check of retail websites of major computer system manufacturers confirms that even entry-level computers – targeted to the price-sensitive consumer segment of the market – overwhelmingly feature DDR2 components.[32] It

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> [It] is somewhat problematic . . . that just over six years have passed since Microsoft engaged in the first conduct plaintiffs allege to be anticompetitive. As the record in this case indicates, six years seems like an eternity in the computer industry. By the time a court can assess liability, firms, products, and the marketplace are likely to have changed dramatically. This, in turn, threatens enormous practical difficulties for courts considering the appropriate measure of relief in equitable enforcement actions, both in crafting injunctive remedies in the first instance and reviewing those remedies in the second. . . . [But we] do not mean to say that enforcement actions will no longer play an important role in curbing infringements of the antitrust laws in technologically dynamic markets, nor do we assume this in assessing the merits of this case. Even in those cases where forward-looking remedies appear limited, the Government will continue to have an interest in defining the contours of the antitrust laws so that law-abiding firms will have a clear sense of what is permissible and what is not.

[32] As of January 2007, the lowest-priced "home and home office" desktop computers from Dell, Hewlett Packard, Gateway, and Apple all featured DDR2 SDRAM, according to their retail websites.

has been projected that DDR2 will achieve a market share of over 77 percent of DRAM revenues in 2007, and over 84 percent by 2008.[33]

If the Commission's remedy does not reach DDR2, it will fail to eradicate the lingering effects of Rambus's illegal conduct.[34] Consumers deserve more effective and complete relief, wherever possible. Complaint Counsel correctly assert[35] that a DDR2 remedy would help to "creat[e] a breathing spell during which independent pricing might be established without the hangover of the long existing pattern of [anticompetitive conduct]."[36] By extending the remedy to DDR2, the Commission would give the market an opportunity to consider alternative technologies for DDR3 and subsequent standards.

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[33] Semico Research Corp., *Computing Applications Dominate DRAM Volume: The Growth of White Box*, Appx. Table 6 (June 2004, Report No. VM-102-04). According to this report, DDR2 DRAM has been projected to account for nearly $25 billion out of a total of $32.2 billion in DRAM revenues in 2007, and $33.6 billion out of $39.9 billion in 2008.

[34] "A public interest served by such civil [antitrust] suits is that they effectively pry open to competition a market that has been closed by defendants' illegal restraints. If this decree accomplishes less than that, the Government has won a lawsuit and lost a cause." Int'l Salt Co. v. United States, 332 U.S. 392, 401 (1947), *quoted in* Ekco Products Co., 1964 FTC LEXIS 115, 125 (1964).

[35] CCBR at 18

[36] Assoc. of Conference Interpreters, 123 F.T.C. 465, 659-60 (1997) (quoting FTC v. Nat'l Lead, 352 U.S. 419, 425 (1957)

E. Unjust Enrichment and Deterrence: Rambus Should Not Be Allowed to Profit From Its Unlawful Conduct

A remedy that fails to reach DDR2 will leave Rambus free to extract royalties on sales of a vast majority of JEDEC-compliant components currently, and soon to be, in the SDRAM marketplace. If Rambus is allowed to keep all of its DDR2 royalties on a going-forward basis, Rambus's exclusionary conduct will continue to be rewarded, as it already has been. This constitutes unjust enrichment, which is unfair to consumers.

It also may hamper effective deterrence, which should be one of the primary objectives of any remedy. As Areeda and Hovencamp state, "the goal of antitrust remedies is general deterrence, not simply destruction of a single monopoly for whatever social good that in itself might impose."[37] The Commission has sent a strong message in its liability opinion, and most participants in standard-setting organizations will take this message to heart. But the bottom-line result of the Commission's remedy is this: Rambus will continue to reap financial benefits that are reasonably related to its successful subversion of JEDEC's standards.

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[37] III AREEDA & HOVENCAMP, *supra* note 28, at 710b4(C).

In the Matter of Rambus, Inc.

Docket No. 9302

Statement of Commissioner J. Thomas Rosch, Concurring in Part and Dissenting in Part

I.

I concur in Parts I, II and IV of the majority decision, with the exception of the above zero royalty rate licensing provisions of the majority's decree that are described in Part IV B of the decision.[1] I respectfully dissent from Part III of the decision and from those above zero royalty rate provisions of the decree.

With respect to the majority's discussion of the Commission's remedial authority in Part II of its decision, I would only add that the Section 2 violation the Commission has found is a *continuing* violation of Section 2. The Commission found not just that Rambus engaged in a deceptive course of conduct, but that Rambus obtained enduring monopoly power by virtue of that deceptive course of conduct. Rambus continues to exploit that monopoly power by seeking royalties from those who practice the SDRAM and DDR-SDRAM standards. When a monopoly position is wrongfully acquired, exploitation of that monopoly position constitutes monopolization violative of Section 2.[2] Thus, by continuing to exploit its unlawfully

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[1] This opinion uses the same abbreviations used in the majority opinion.

[2] *See* In re American Cyanamid Co., 72 F.T.C. 623, 690 (1967), *aff'd* Charles Pfizer & Co. v. Federal Trade Commission, 401 F.2d 574, 579-80 (6th Cir. 1968) (upholding Commission finding that defendants engaged in attempted monopolization by

acquired monopoly position, Rambus is engaging in a continuing violation of Section 2.

Rambus does not deny that when there is a continuing violation, the Commission can issue whatever order is reasonably necessary to stop the violation from continuing. For example, Rambus admits that when a merger violates Section 7 of the Clayton Act, the Commission is not limited to enjoining future acquisitions violative of Section 7, but can order divestiture of the merged assets[3] This admission is not gratuitous. Courts may issue whatever order is reasonably necessary to stop a monopolist from continuing to exploit its unlawfully acquired monopoly power. There is no principled reason why the Commission's power to remedy a Section 2 violation should be more cramped than the remedial authority of a district court to deal with such a continuing violation.

I agree with the majority's discussion in Part II B of the legal principles governing the Commission's authority to order royalty free licensing. Specifically, I acknowledge that there are significant limiting principles on the Commission's power to require royalty-free licensing. First, as the majority states, that remedy cannot go beyond what is reasonably neces-

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exploiting a patent acquired by withholding information from the Patent Office); *see also* Warner-Lambert Co. v. Federal Trade Commission, 562 F.2d 749, 766, note 3 (D.C. Cir. 1977) (dissenting opinion) (distinguishing between an order eliminating the effects of a violation from an order stopping a continuing violation and stating with respect to the latter that while "[a] legally obtained patent permits a valid monopoly for the period of the patent; an illegally obtained patent shelters an invalid monopoly which can be 'broken up' by requiring the patent holder to license its patents to competitors.").

[3] *See* RRBR at 1.

sary to stop a continuing violation of Section 2 and/or to terminate the ill effects of the violation.[4] That means in this case that the Commission must conclude on the basis of the record that in the "but for world" – *i.e.*, the world that would have existed had Rambus not engaged in its deceptive course of conduct – Rambus would not have obtained any royalties. The parties agree on this limiting principle.[5]

Second, as the majority says, there is a spectrum of remedies with controls on conduct at one end and structural measures such as divestiture at the other end. The Commission should impose an order based on the record which is as close to the "conduct" end of the spectrum as possible so long as that remedy will insure that Rambus cannot continue to exercise its monopoly power and/or retain the fruits of its violation. That means that, having determined what the "but for world" would have looked like, the Commission must consider whether there is a more "conduct-like" remedy than royalty-free licensing which will reflect the conditions of the "but for world."

Third, the majority is correct in asserting that there must be "special proof" of the need for that remedy. Rambus is also correct that Complaint Counsel bears the burden of proving what the "but for world" would have looked like.[6] Rambus's counsel conceded at oral argument that it is unclear what proof would suffice.[7] Areeda and Hovenkamp state

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[4] *See* Ford Motor Co. v. United States, 405 U.S. 562, 573 n. 8 (1972); Reynolds Metals Co. v. Federal Trade Commission, 309 F.2d 223, 231 (D.C. Cir. 1962).

[5] *See* CCBR at 1; RBR at 6; RRBR at 1.

[6] *See* 16 C.F.R. §3.43 (a).

[7] Oral Argument before the Commission on the Issue of Rem-

that where the relief sought is necessary "to eradicate all the consequences of the act, . . . any plausible doubts should be resolved against the monopolist."[8] That said, however, I agree that there must be strong proof that Rambus would not have reaped royalties in the "but for world" in order to support royalty-free licensing, and that proof must substantially outweigh the evidence of the "but for world" proffered by Rambus.[9]

II.

A.

To begin with, it bears emphasis that the parties have stipulated to three points related to the appropriate remedy.[10] First, assuming the Commission's remedial authority extends beyond entry of an order requiring Rambus to cease and desist engaging in deceptive conduct, the Commission must seek to restore conditions to those that would have existed in the "but for world." Second, the remedy should address only patents with respect to JEDEC-compliant products. Third, the Commission should adopt a remedy expeditiously and based on the existing record. The third stipulation is especially important here, rein-

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edy (Nov. 15, 2006), at 70-71.

[8] AREEDA & HOVENKAMP, ANTITRUST LAW 653(f), at 104 (2002).

[9] The majority expresses itself somewhat differently, concluding that "Complaint Counsel must show that this form of relief is necessary to restore competitive conditions that would have prevailed absent Rambus's misconduct." Majority Opinion at 10. I do not discern any daylight between our views in this respect. Under both formulations, Complaint Counsel must bear the ultimate burden of proving that the compulsory licensing remedy they seek is needed to restore the conditions that would have existed but for Rambus's misconduct.

[10] *See* RRBR at 1, CCBR at 1, 23-24.

forcing the Commission's obligation to insure that the remedy adopted is firmly grounded in the record. Based on the record before the Commission in this case, I would issue a royalty-free decree more limited in scope than that sought by Complaint Counsel, ordering Rambus to license its technologies royalty free to those practicing JEDEC's SDRAM and DDR SDRAM standards. I therefore respectfully dissent from the majority's decree in that respect.

B.

Rambus insists that the fact that JEDEC adopted standards incorporating its four patented technologies establishes that JEDEC and its members preferred those technologies over alternatives and that this preference would have enabled Rambus to obtain substantial royalties in the "but for world."[11] Complaint Counsel, on the other hand, insist that the Commission has already found that but for Rambus's deceptive course of conduct, JEDEC would have selected unpatented technologies over Rambus's patented technologies.[12] Both sides overstate the record and the Commission's earlier findings.

Rambus's argument that JEDEC and its members would have selected its technologies even if they were fully informed about Rambus's patents and patent applications is not supported by the fact that they did so when they were *not* informed about those patents and patent applications. On the other hand, Complaint Counsel are wrong in asserting that the Commission has already concluded that a fully informed JEDEC and its members would not have incorporated the patented technologies in the standards. The

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[11] *See* RBR at 3-4, 8, 22; RRBR at 9-10.

[12] *See* CCBR at 4-5.

Commission has, to be sure, concluded that Rambus failed to establish that the costs of alternatives exceeded the costs of Rambus's patented technologies, but in that analysis the Commission included as a portion of Rambus's costs the royalties Rambus has been demanding.[13] The Commission did not hold that a fully-informed JEDEC would have adopted the alternatives if Rambus's technologies were demonstrably superior to them on a net cost/performance basis. Thus, I reject both of these contentions.

C.

However, there is strong evidence in the record that if JEDEC had been aware of the potential scope of Rambus's patent portfolio, it would have adopted standards that would have avoided Rambus's patents. JEDEC's rules, the expectations of its membership, and the market's concerns with costs generally and the cost of Rambus's technologies in particular all strongly support a finding that a fully informed JEDEC would have adopted standards that did not read on Rambus's patents.

JEDEC's written policies reflected deep concern with incorporating patented technologies into standards.[14] Those concerns were echoed by JEDEC's

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[13] *See* Op. at 95-96.

[14] *See* CX 207a at 8 (1990 EIA Style Manual that governed standards issued by JEDEC [one of EIA's units], stated that JEDEC should "[a]void requirements in EIA standards that call for the exclusive use of a patented item or process"); CX 208 at 19 (1993 JEDEC Manual of Organization stated that "committees should ensure that no program of standardization shall refer to a product on which there is a known patent unless all of the relevant technical information covered by the patent is known"); JX 53 at 11 (1993 EIA Manual stated that "[r]equirements in EIA Standards which call for the use of pat-

members who repeatedly testified about their opposition to incorporating patents into JEDEC standards.[15] The record demonstrates that the consensus needed to adopt Rambus's patented technologies could not have been achieved because some of JEDEC's most powerful members (*e.g.*, Sun Microsystems) were especially loathe to adopt patented technologies.

The record also demonstrates that JEDEC's membership was particularly concerned with incorporating technologies into JEDEC's standards that could potentially read on Rambus's patents. JEDEC members testified that if they had known of Rambus's patents and patent applications at the time, they would not have voted to incorporate those technolo-

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ented items should be avoided"); *see also* JX 5 at 4 (JEDEC minutes stated, "If it is known that a company has a patent on a proposal then the Committee will be reluctant to approve it as a standard."); J. Kelly, Tr. 2073-2074 ("JEDEC, however, is concerned and I said before that JEDEC and EIA do not have a preference for including intellectual property in standards because of the fact that there may be a royalty that may increase the cost. The goal is always to try to produce a standard which is going to gain marketplace acceptance, and if the cost of the product is going to -- is likely to be increased by intellectual property, that's a general concern. That doesn't go to the licensing terms, however. That goes to the basic question of whether to include the IP at all or not.").

[15] *See* Bechtelsheim, Tr. 5813-14; *see also* Sussman, Tr. 1417 (Sanyo's JEDEC representative testified, "If I understood that there was IP on the programmable, I would have voted – changed my direction and voted to take the fixed one."), G. Kelley, TR 2576 (IBM's JEDEC representative noting that "[p]atent issues are a concern on every JEDEC proposal" and that when a technology was considered for the first time "it was especially valuable to have the consideration of patents so that we could possibly avoid them").

gies into the standard.[16] That testimony is consistent with the real world behavior of JEDEC and its membership. For example, several members objected to a proposal for the DDR SDRAM standard because they were concerned that it might be covered by Rambus's '703 patent – the one patent that Rambus had disclosed while it was a member of JEDEC.[17] JEDEC immediately dropped the proposal and turned to consideration of technologies that it believed avoided Rambus's patent.[18] Another example was the reaction of the marketplace to Rambus's proprietary DRAM standard – RDRAM. Rambus failed in its efforts to position RDRAM as the de facto market standard, at least in part, because the DRAM manufacturers' con-

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[16] *See, e.g.*, Landgraf, Tr. 1714 (HP's JEDEC representative testified that if Rambus had disclosed its patent applications, and "[i]f we knew in advance that they were not going to comply with the JEDEC patent policy, we would have voted against it"); Lee, Tr. 6686, 6717 (Micron's JEDEC representative testified that knowledge of Rambus's patent applications would have caused Micron to oppose on-chip PLL/DLL and dual-edge clocking).

[17] *See* JX 36 at 7; Lee, Tr. 6695-96 ("Many other people in the room also objected. There was a variety of comments from quite a few people from the committee who were -- strongly objected to the consideration of this proposal for the standard").

[18] *See* Rhoden, Tr. 527-28; CX 368 at 2 (Micron presentation to JEDEC proposing an alternative standard to avoid Rambus's technology noted that "[l]oop-back strobe could have intellectual property problems"). Rambus would have the Commission ignore JEDEC's rejection of its patented technology because it occurred after Rambus left JEDEC. Rambus argued that at that point JEDEC could not seek or enforce a RAND commitment from Rambus. There is nothing in the record to suggest that JEDEC could seek or enforce a RAND commitment only from its members.

cerns about cost led them to adopt standards that they believed were not proprietary.[19]

Rambus tried to rebut this evidence by pointing to evidence that JEDEC sometimes adopted patented technologies into its standards after it received RAND assurances .[20] However, in all but one instance (Mosaid, whose patents were not essential to the standard), the evidence shows that the holders of those patents were, unlike Rambus, manufacturers, and that JEDEC viewed manufacturers differently from non-manufacturers, believing that the former had incentives to cross-license their technology for *de minimis* or no royalties.[21] Thus, it does not follow that

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[19] *See* CX 961 at 1 (September 1997 Intel e-mail to Rambus CEO Tate stating the concern that, for at least the low end of the market, "absolute cost is the critical factor" and alternatives "need not be equivalent performance," and warning that, upon analyzing the royalty obligations attached to RDRAM, the industry would develop alternatives); RX 1482 at 12.

[20] *See* JX 1 at 6 (DEC's patented technology was incorporated into the SDRAM standard after DEC agreed in writing to a 1% royalty); JX 13 at 9, 136 and CX 54 at 8 (Motorola's patented technology was incorporated into the standard after it agreed to RAND terms); JX 19 at 12, 28 (JEDEC adopted a standard that could incorporate a Texas Instruments patent. Several members had voiced concerns but those concerns were assuaged after Texas Instruments wrote that "a review of TI's patent makes clear that, while the TI patent presents advantages in making Quad CAS memories, it is not essential."); CX 400 at 2 (JEDEC adopted a standard that incorporated Mosaid's patent after Mosaid stated that it would license its technology on RAND terms); Sussman Tr. 1423-1424 (Mosaid also stated that its patent applied only to particular implementations of the technology and consequently "you can design around it").

[21] *See* Lee, Tr. 6717 ("We have a responsibility in JEDEC to try to avoid the use of patents whenever possible in creating a standard, and also our company has a similar policy, as we try to avoid the use of patents whenever possible. Particularly I'd

because JEDEC was willing to adopt the technologies of those manufacturer patent holders it would have been willing to do so in Rambus's case.

It is also suggested that the testimony of JEDEC members should not be credited because their testimony is, *inter alia*, "necessarily speculative even if sincere."[22] However, in the context of mergers the Commission has embraced unimpeached customer testimony as powerful evidence of the "but for world."[23] Where, as here, customer testimony is not only given under oath but is supported by the actions of the customers before the controversy has arisen, and is otherwise unimpeached, there is no reason not to credit it. Although it is also said that the testimony of JEDEC's members is contrary to their agreement "to incorporate patented technologies into the SSO's standard in several instances," that is not supported by the record respecting the actions of JEDEC's members where Rambus or companies like Rambus that were pure inventors (as contrasted with manufacturers) were involved.[24]

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have to say in the case where Rambus is not a manufacturer, it wouldn't have even been a situation where we could have cross-licensed. So, we would have been strongly opposed [to using the technology in the standard]."); G. Kelley, Tr. 2640-41 ("I believe that IBM was concerned, . . . with licensing the royalties for companies that it was not cross-licensed with."); see also McAfee, Tr. 7493-94.

[22] *See* Majority Opinion at 16.

[23] *See* Deborah Platt Majoras, Chairman Federal Trade Comm'n, "Recent Actions at the Federal Trade Commission," Remarks Before the Dallas Bar Association's Antitrust and Trade Regulation Section at 2 n. 4 (January 18, 2005) available at http://www.ftc.gov/speeches/majoras/050126recentactions.pdf.

[24] *See* Majority Opinion at 16.

In short, the record seems to me strongly to support the conclusion that in the "but for world" JEDEC and its principal stakeholders (the DRAM manufacturers), if fully informed about Rambus's patents and pending patents, would not have incorporated Rambus's technologies in the SDRAM and DDR SDRAM standards. In a world with alternative technologies, which was the real world here,[25] Rambus would not be in a position to collect royalties from those practicing those standards. That conclusion in turn would support a decree requiring Rambus to license on a royalty-free basis the patents that were not disclosed to those practicing the SDRAM and DDR SDRAM standards.

D.

It also seems to me that on this record there is no remedy which comports with the "but for world" but which, at the same time, is closer to the "conduct" end of the remedy spectrum than is the limited compulsory licensing remedy I would adopt. Rambus claims otherwise, contending that the evidence respecting the "but for world" described above is outweighed by evidence of a "but for world" in which Rambus and a fully informed JEDEC and its members would have agreed to licenses of Rambus's patents at royalty rates above zero. I do not agree.

Specifically, Rambus argued that, at a minimum, in the "but for world" it would be able to collect a 2.5% royalty from those practicing JEDEC's SDRAM and DDR SDRAM standards. [26] Rambus's claims about the "but for world" are threefold. First, Rambus

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[25] *See* Op. at 76 (discussing the presence of alternative technologies at the time JEDEC made its standard decisions).

[26] *See* RB R at 3 -4.

asserts that if it had disclosed its potential patent portfolio, JEDEC would have requested a RAND commitment from Rambus (a commitment to license its technology on reasonable and nondiscriminatory terms), and Rambus would have obliged.[27] To be sure, JEDEC policies permitted (but did not require) JEDEC to incorporate patented technologies into its standards when RAND commitments were given.[28] However, the record shows that Rambus was strongly opposed to RAND terms because they were contrary to its business model.[29] There is also evidence that on at least two occasions, Rambus made it clear that it

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[27] *See* RBR at 10-11; RRBR at 9-10.

[28] *See* CX 208 at 27 (1993 JEDEC Manual of Organization and Procedure states that "[s]tandards that call for use of a patented item or process may not be considered by a JEDEC committee unless all of the relevant technical information covered by the patent or pending patent is known to the committee, subcommittee, or working group," and the patent holder submits written assurance that it will license without charge or under "reasonable terms and conditions that are demonstrably free of any unfair discrimination"); *see also* J. Kelly, Tr. 1885-86; CX 208 at 19 (noting that "the word 'patented' also includes items and processes for which a patent has been applied and may be pending"); CX 203a at 11 (1981 EIA Manual); CX 207a at 8 (1990 EIA Manual) (1990); JX 55 at 28 (1995EIA Manual).

[29] *See* CX 873 ("Rambus Inc. cannot agree to the terms of the JEDEC patent [licensing] policy"); CX 874 ("the patent [licensing] policy of JEDEC does not comport with our business model"); CX 888 ("Rambus plans to continue to license its proprietary technology on terms that are consistent with the business plan of Rambus, and those terms may not be consistent with the terms set by standards bodies, including JEDEC"); Diepenbrock, Tr. 6228-29 ("RAND terms [were] inconsistent with Rambus's existing business practices").

would not commit to RAND terms in the standard setting context.[30]

Rambus urged the Commission to ignore what it said because its statements and documents do not mean what they say. It cites testimony from its expert, Dr. Teece, that Rambus had every incentive to commit to RAND terms.[31] However, Dr. Teece's testi-

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[30] Rambus's June 17, 1996 letter resigning from JEDEC stated that "Rambus plans to continue to license its proprietary technology on terms that are consistent with the business plan of Rambus." CX 887; *see* CX 3129 at 488-489 (Vincent). The IEEE, another SSO working on DRAM, sought to get a RAND commitment from Rambus for its Ram Link and SyncLink standards. *See* CX 487 (letter from an IEEE standards committee asking Rambus whether a proposed standard infringed on any of Rambus's patents and if so whether Rambus was willing to commit to RAND licensing terms.). In noting that it was not a member of the IEEE, Rambus refused to make a RAND commitment. *See* CX 855 (Rambus's letter responding that it will "continue to license its technology in accordance with [Rambus's] existing business practices."); CX 853 (a draft of Rambus's response made its position on RAND even clearer, "Rambus will not, however, issue the letter of assurance that you have requested regarding a non-discriminatory license. Indeed, Rambus is offering no such license. Rambus reserves all rights to enforce its intellectual property on whatever terms Rambus decides."); *see also* CX 490; CX 869.

[31] Teece, Tr. at 10341-10351. Dr. Teece's testimony assumed that Rambus would have been desperate to be included in JEDEC's standards because Rambus would have been left with nothing if they were left out of those standards. Yet at the time those standards were adopted, it was not clear that they would be the marketplace standards. Thus in the "but for world" Rambus would not have been desperate to be included in JEDEC's standards. *See, e.g.*, Macri, Tr. 4620-21 (discussing CX1315, he states, "[U]sually in the DRAM world, there is only one choice. You know, it's not a matter of what; it's a matter of when. So, users, they can plan their transition based on their own -- you know, their own internal decision-making process, plan their

mony was the only evidence in the record that contradicted the position staked out in Rambus's documents and the testimony of its own executives that it would not consent to licensing on RAND terms.

Rambus's counsel could not cite the testimony of a single percipient witness, nor a single document in the record, to support its position that Rambus would have offered a RAND commitment.[32] Thus, while it is arguable that, as a matter of logic, Rambus might have accepted something rather than nothing, it is another matter to say that is what would have happened in a "but for world" when there is no *factual evidence* to support that conclusion.

The record also shows that Rambus was willing to act contrary to its own self-interest in setting its RDRAM royalty rates; its RDRAM royalty rates were

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transition to meet their own business needs. The suppliers, they know making the investment up front is going to be realized, because they know the users will eventually move over. It may not all be at once, but over a period of time, they can count on the market slowly building up. In this particular case [when both DDR SDRAM and RDRAM could have become the dominant standard], there were two choices, and it was very unclear which way the world would go.")

[32] *See* Oral Argument before the Commission on the Issue of Remedy (Nov. 15, 2006), at 60-61. The assertion was made that Dr. Teece's testimony about Rambus's incentives to agree to RAND terms in the "but for world" was uncontroverted. *See id* at 59-61. *But see* McAfee, Tr. 11311 ("In my understanding of Rambus's business strategy -- and I should say the business strategy that one uses in the 'but for world' should mimic the business strategy one sees in the actual world, and so the actual business strategy would be the relevant strategy -- I see not a certainty but a significant likelihood that Rambus would refuse to issue a RAND letter. In fact, I think more likely than not they may refuse to issue a RAND letter, based on their business strategy.").

substantially above those that the industry participants like Intel felt were necessary to make RDRAM successful.[33] Moreover, it is not clear, even as a matter of logic, that committing to RAND terms for SDRAM and DDR SDRAM would necessarily have been in Rambus's self-interest. The record shows that Rambus considered RDRAM to be its flagship technology.[34] A RAND commitment in return for the incorporation of Rambus's technology into JEDEC's standards would have been counter to Rambus's economic interest because it would have facilitated the acceptance of SDRAM and DDR SDRAM, rather than RDRAM, as the dominant industry standard.[35]

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[33] *See* CX 952 (Rambus executive Geoff Tate reported in an email that "they [Intel] want us to have license deals that reward time to market, etc (old request) AND have long term reduction of royalty based on volume going to less than 1/2% [0.5%] for rdrams (at this point i choked /gasped)").

[34] *See* CX 533 at 9-10; CX 535 at 1, 4-5; CX 543a at 11-12, 16; Farmwald, Tr. 8204-8205.

[35] The majority reasons that since the adoption of SDRAM and DDR SDRAM standards was inevitable, RDRAM would not have been disadvantaged if Rambus made a RAND commitment to license its SDRAM and DDR SDRAM technology at royalties limited to the "value added" of those technologies. *See* Majority Opinion at 14. But the record shows that is not how Rambus felt. Rambus expressly rejected a RAND commitment because it "does not comport with our business model." *See* sources cited *supra* note 30. That is not surprising. However "inevitable" the adoption of the SDRAM standards was, there is nothing in the record to support a hypothesis that it was inevitable that those standards, instead of RDRAM, would be the dominant standards. Had Rambus offered a low royalty rate for its SDRAM and DDR SDRAM technologies, it not only would have been competing against itself (i.e., against its higher RDRAM royalty rates) but it would have insured that the SDRAM standards, instead of RDRAM, would become the dominant standard.

Second, Rambus contends that in the "but for world" it would have been able to negotiate royalties that would "compensate it for the incremental value of its patented inventions over the alternatives."[36] However, there is no evidence that JEDEC or its members had ever negotiated a royalty rate based on a patented technology's "incremental value" *ex ante* in return for incorporating a patented technology into its standards. Nor is there evidence that JEDEC or its members even had the expertise to do that.

Beyond that, the evidence relied on by Rambus to support this argument was shown to be unreliable and without foundation. Rambus's expert, Dr. Rapp, presented a cost-benefit analysis that purported to show that Rambus's patented technologies had "incremental value" as compared with alternative technologies.[37] Rambus used that to argue that it should be compensated for that "incremental value." However, Dr. Rapp's testimony was rooted in the opinion of Rambus's cost expert, Mr. Geilhufe. Mr. Geilhufe's cost estimates were largely without foundation – he admitted that in formulating those estimates he failed to review JEDEC records, interview JEDEC members or review cost information from DRAM manufacturers.[38] He also admitted that he had no identifiable methodology, much less one with general acceptance among DRAM developers and manufacturers, and that there was no way to test his conclusions.[39] Thus, it appears that his testimony did not measure up to the standards for expert testimony

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[36] RB R at 10.

[37] Rapp, Tr. 9815-9827.

[38] Geilhufe, Tr. at 9617-23.

[39] Geilhufe, Tr. at 9622, 9665-9666.

described by the Supreme Court in *Kumho Tire Co. v. Carmichael*.[40] Rambus's reliance on a flawed cost-benefit analysis is juxtaposed against Complaint Counsel's "but for world" that is supported by contemporaneous documents and testimony and buttressed by the testimony of their experts.

Mention is made that Complaint Counsel did not submit a cost-benefit analysis of their own. Insofar as that is considered to undercut Complaint Counsel's challenge to Rambus's position that it would have been compensated for the "incremental value" of its technology in the "but for" world, the contention fundamentally misconceives of the way that a fact is proved at trial. One way to prove what would have happened in the "but for world" is by the submission of direct evidence. However, there is no such direct evidence of what would have happened had Rambus fully informed JEDEC and its members of its patent and patent applications because Rambus did not do so. Hence, the "but for world" must of necessity be proved by circumstantial evidence.[41]

One kind of circumstantial evidence is an after-the-fact cost-benefit analysis by an expert witness. However, it is only one kind. Complaint Counsel were not obligated to submit the same kind of circumstantial evidence, and that is especially true here. Rambus having failed to show that JEDEC would (or could) conduct an *ex ante* cost-benefit analysis and Complaint Counsel having impeached the after-the-fact analysis submitted by Rambus, there was no need for Complaint Counsel to submit a dueling cost-benefit

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[40] 526 U.S. 137, 149-150 (1999).

[41] *See* In re Citric Acid Litig., 191 F.3d 1090, 1093 (9th Cir. 1999).

analysis. Complaint Counsel could submit the other forms of circumstantial evidence that they did – *i.e.*, evidence of the contemporaneous views and actions of JEDEC and its members vis-a-vis patented technologies and of Rambus's antipathy toward a RAND commitment – in order to prove the ultimate fact regarding what would have happened in the "but for world." In short, there is no basis in the record for concluding that JEDEC would have embraced Rambus's technology in any event.

Third, Rambus argues that the best record evidence of the royalty rate that it would have charged after an *ex ante* negotiation with JEDEC members is the 2.5% royalty rate for "other DRAM" in its 1995 RDRAM license agreement with Hyundai.[42] However, the Hyundai agreement was predominantly a *RDRAM* license agreement and the record provides little context for the negotiation of that clause.[43] For example, as the majority opinion points out, the 2.5% figure may have been inflated as a result of trade-offs with other aspects of the license.[44] There is also evidence in the record that this provision was nothing more than "insurance" against what Hyundai considered improbable claims by Rambus based on other unknown patents.[45] Finally, the "other DRAM"

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[42] RBR at 17-18; RRBR at 13. Rambus asserts elsewhere that any attempt by JEDEC members to fix *ex ante* royalty rates collectively would have been in violation of the antitrust laws. *See* RBR at 23-25.

[43] *See* CX 782; CX 711 at 61-63.

[44] *See* Majority Opinion at note 139.

[45] *See* CX1599 ("Semiconductor Technology License Agreement between Hyundai Electronics Industries Co., Ltd. and Rambus, Inc." dated December 1995); CX2107 at 84-85, 91-96, 99-102 (Oh FTC Dep.) (*in camera*).

clause was unique to the Hyundai agreement, and it was not retained by Hyundai when it renegotiated its license with Rambus.

E.

Nor can I subscribe to the royalties above zero that are ordered in the majority's mandatory licensing decree. Specifically, the decree would order Rambus to license its SDRAM technologies to DRAM manufacturers at a royalty rate of .25% and to license its DDR SDRAM technologies to those manufacturers at a royalty rate of .50% for three years, after which the royalty rates would drop to zero; the decree's mandatory rates for controller manufacturers and others would be 2x those rates.[46] Those royalty rates represent an *80%* discount for DDR SDRAM and an *90%* discount for SDRAM from the rates proposed by Rambus. Those above zero royalty rates are arguably a more "conduct-like" remedy than the limited zero based royalties I favor (at least for three years). However, I am mindful of the Supreme Court's admonition that "each case arising under the Sherman Act must be determined upon the particular facts disclosed by the record."[47] I am also mindful of Rambus's admonition that the Commission should not involve

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[46] The royalty rates for controllers and devices other than DRAMs are extrapolated from royalties that Rambus negotiated with DRAM manufacturers if and to the extent that those manfacturers also made controllers or other downstream devices. There is no basis in the record for determining royalty rates for independent manufacturers of controllers or other downstream devices.

[47] Maple Flooring Mfg. Ass'n v. United States, 268 U.S. 563, 579 (1925); *see also* Eastman Kodak Co. v. Image Technical Servs., Inc., 504 U.S. 451, 467 (1992)

itself in speculative price administration.[48] The decree's above zero royalty rates, and the underlying premise that in the "but for world" Rambus would have agreed to them *ex ante*, seem to me to be contrary to the record as it relates to Rambus's positions and conduct.

First, the decree's royalty rates above zero assume that Rambus would have agreed *ex ante* (*i.e.*, in 1996 and 2000 respectively when Rambus technology was incorporated into JEDEC's SDRAM and DDR SDRAM standards) to RAND terms. As discussed above, Dr. Teece, who was not a percipient witness, is the sole support in the record for this assumption; the record established that Rambus insisted both privately and publicly it would not commit to RAND terms; and Dr. Teece's opinion that, notwithstanding those repeated declarations, Rambus would not have acted contrary to its self-interest, is contrary to its RDRAM pricing conduct.[49] Rambus's fundamental goal was to make RDRAM the industry standard. A RAND commitment to JEDEC would have made it even more difficult for Rambus to get the industry to adopt its competing product – RDRAM – as the marketplace standard.[50]

Second, the decree's above zero royalty rates use RDRAM royalty rates as the starting point for calcu-

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[48] *See* RBR at 15, (citing Judge (now Justice) Breyer's decision in Town of Concord, Mass. v. Boston Edison Co., 915 F.2d 17, 25 (1st Cir. 1990) and United States v. Addystone Pipe & Steel Co., 85 F. 271, 283-84 (6th Cir. 1898).

[49] *See* Oral Argument before the Commission on the Issue of Remedy (Nov. 15, 2006), at 60-61; *supra* notes 29-31, 33 and accompanying text.

[50] *See* discussion *supra* 8-9.

lating *ex ante* "reasonable" royalty rates for SDRAM and DDR SDRAM.[51] However, Rambus has repeatedly asserted that RDRAM rates are not appropriate benchmarks to use in calculating SDRAM or DDR SDRAM royalty rates[52] because, *inter alia*, the RDRAM rates Rambus negotiated were lower than they would have been had it not been necessary to "jump-start" demand for this new technology in order to make a market for it.[53] This contention is supported by the record, which shows that Rambus's initial RDRAM royalty rates started out at 1% in 1991 and rose to 2.5% after RDRAM appeared to gain traction in the market due to Intel's endorsement of RDRAM in late 1995.[54] Nor has Complaint Counsel

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[51] This assumption is based on a Samsung licensing agreement, which is just one of many different RD RAM licensing agreements in the record.

[52] RBR at 21-22; RRBR at 15.

[53] *See* RX 1532 at 1 (Intel timeline "December '95: chose RDRAM as the direction we [Intel] would pursue."); Hampel, Tr. 8677-78 (Rambus saw an increase in customer interest after Intel endorsed RDRAM: "There were more customers interested. We did increase kind of the workload . . . to support the effort"); Appleton, Tr. 6345 ("once Intel endorsed [] RDRAM, then the probabilities of customers in the marketplace actually using it increased quite a bit, and as a result, we also then believed that some customers would use RDRAM and that we needed to then engage to negotiate for a license."); CX 2107 at 117 (Oh FTC Dep.) (*in camera*).

[54] *See* RX 538 at 22 (In 1991, NEC was one of the first to license RDRAM. Its agreement with Rambus provided for a 1% rate); CX 1592 at 23 (In November 1994, Samsung licensed RDRAM. Its agreement with Rambus provided for an initial 2% royalty rate on the first ten million units); CX 1600 at 12 (In December 1995, Hyundai signed its RDRAM licensing agreement with Rambus. Hyundai agreed to pay an initial 2.5% royalty on sales made between 1995 and 2000); CX 1609 at 11 (In February 1997, Mitsubishi licensed RDRAM from Rambus. That

asserted that RDRAM rates are appropriate benchmarks for calculating SDRAM or DDR SDRAM rates. Thus, the use of RDRAM rates as the starting point for calculating SDRAM and DDR SDRAM rates in the "but for world" is not supported by either party.

Third, the decree's royalty rates above zero assume that Rambus would have been willing to agree to *discount* its *lowest* initial RDRAM royalty rate by more than 50% to 75% in calculating "reasonable" SDRAM and DDR SDRAM royalty rates. More specifically, the lowest initial RDRAM royalty rate given to a DRAM manufacturer was 1% and that was given to NEC alone.[55] The decree's "but for world" royalty rates are .25% for SDRAM manufacturers and .50% for DDR SDRAM manufacturers (or 25% and 50% of NEC's RDRAM royalty rates). Moreover, NEC (and all other RDRAM licensees) were obliged to pay substantial up-front fees in addition to the royalty rate.[56] After accounting for those up-front fees, the decree's royalty rates assume that Rambus would have been

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agreement provided for an initial 2.5% royalty until 2000); CX 1617at 11-12 (Siemens/Infineon signed a RDRAM licensing agreement with Rambus in July 1997. That agreement provided for an initial 2.5% royalty rate.).

[55] *See* sources cited *supra* note 54.

[56] *See* RX 538 at 21 (1991 NEC RDRAM license agreement included a $2 million up-front license fee in addition to royalties on sales); CX 1592 at 21 (1994 Samsung RDRAM license agreement included a $3 million up-front license fee); CX 1600 at 11-12 (1995 Hyundai RDRAM license agreement included a $2 million upfront license fee and $1.5 million "Design Fee."); CX 1609 at 10 (1997 Mitsubishi RDRAM licenses agreement included a $2 million up-front license fee and a $3.5 million "Direct Rambus DRAM Engineering Fee."); CX 1617 at 11 (1997 Siemens/Infineon RDRAM licenses agreement included a $5.5 million up-front license fee and a $4 million "Engineering Fee.").

willing to agree to discount its lowest initial RDRAM royalty rate by *more* than 50%-75% in calculating a "reasonable" royalty rate for JEDEC's principal stakeholders.[57] As previously discussed, the record shows that Rambus considered RDRAM to be its flagship technology. There is nothing in the record to suggest that Rambus would have been willing to make RDRAM less desirable by giving such better licensing terms to those practicing competitive standards such as SDRAM and DDR SDRAM.[58]

Fourth, the decree's above zero royalty rates assume that, as part of its RAND commitment, Rambus would have agreed not to discriminate against any JEDEC stakeholder in calculating "reasonable" SDRAM and DDR SDRAM royalty rates. The assumption that Rambus would charge all JEDEC stakeholders the same royalty rate is contradicted by the record as it respects Rambus's RDRAM licensing practice. As previously noted, it shows that Rambus's RDRAM license agreements contained initial royalty rates ranging between 1 and 2.5%.[59]

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[57] *See* CX 960 (Rambus executive Geoff Tate stated in an email that "i advised clearly that if a chip co wants to license all of our present and future patents for use for any infringing dram, then the only acceptable deal is the royalty on infringing drams must be greater than the royalty on rambus drams.").

[58] It is argued that these discounted royalty rates reflect the fact that SDRAM and DDR SDRAM demand has matured and products using those technologies are being manufactured in volume. However, there is no evidence that Rambus would have agreed *ex ante* to such deeply discounted royalty rates based on *current demand* (which was hypothetical in 1996 and 2000).

[59] *See* sources cited *supra* note 54. Rambus asserts elsewhere that any attempt by JEDEC members to fix *ex ante* royalty rates collectively would have been in violation of the antitrust laws. *See* RBR at 23-25.

Finally, I am not convinced that a royalty rate above zero is more desirable on policy grounds. I take seriously the majority's concerns that a zero-based royalty might stifle innovation and/or participation in SSOs. However, the existence of complete and accurate information in the marketplace can stimulate output and competition.[60] If that is so, it is equally plausible that honest inventors would be more, rather than less, inclined to innovate if they felt that rivals who engaged in deceptive conduct during the standard-setting process would be denied the fruits of their wrongdoing in their entirety.

Ultimately, I conclude that licensing on terms above zero would enable Rambus to obtain royalties it would not have obtained in the "but for world." That would enable Rambus to continue to reap the fruits of its ongoing violation of Section 2.

F.

Rambus asserts that the Commission has described this conclusion as "extreme."[61] However, that misdescribes the Commission's liability decision. In its decision the Commission described the parties' positions as being at "opposing extremes."[62] We (or at least I) meant by that that the positions of the parties respecting the royalties Rambus would have obtained in the "but for world" were at opposite ends of the

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[60] *See* United States v. United States Gypsum Co., 438 U.S. 422, 441 n. 16 (1978); see also U.S. DEPT OF JUSTICE AND FED. TRADE COMM'N, STATEMENTS OF ANTITRUST ENFORCEMENT POLICY IN HEALTH CARE 1-7 (August 18, 1996), reprinted in 4 Trade Reg. Rep. (CCH) ¶ 13,153.

[61] *See* RBR at 5.

[62] *See* Op. at 119.

spectrum. On the basis of this record, the limited royalty free license that I favor is not extreme.

In rejecting Rambus's characterization of the remedy as extreme, I must emphasize that the royalty free licensing order I would issue would not run against any patents in their entirety. To the contrary, as previously discussed, I would only order royalty free licensing with respect to patents reading on SDRAM and DDR SDRAM standards in favor of those who are practicing those standards. Thus, for example, Rambus would be able to collect royalties on any patents reading on DDR2 SDRAM and all other JEDEC standards from those who practice those standards.

III.

I do not wish to exaggerate my differences with the majority. The majority has done its best to try to construct above zero royalty rates. I simply believe that the assumptions the majority has made in doing that are contrary to the evidence in the record – particularly the evidence related to Rambus's positions and conduct – both in terms of whether ex ante negotiations would have occurred in the "but for world" and in terms of the royalty rates such negotiations would have yielded. However, if I agreed with the majority's assumptions, I would subscribe to the majority's decree because I agree entirely that the Commission has the authority to issue such a mandatory licensing decree.

APPENDIX D

UNITED STATES OF AMERICA
BEFORE FEDERAL TRADE COMMISSION

IN THE MATTER OF RAMBUS INCORPORATED,
a corporation.

Docket No. 9302

Commissioners: **Deborah Platt Majoras,**
Chairman
Pamela Jones Harbour
Jon Leibowitz
William E. Kovacic
J. Thomas Rosch

FINAL ORDER

This matter having been heard by the Commission upon the appeal of Counsel Supporting the Complaint and the cross-appeal of Respondent; and the Commission having determined that Respondent has violated Section 5 of the Federal Trade Commission Act, for the reasons stated in the Opinion of the Commission issued on July 31, 2006; and the Commission having reversed and vacated the Initial Decision, and vacated the Order accompanying the Initial Decision, by Order issued on July 31, 2006, for the reasons stated in the Opinion of the Commission; and the Commission having considered the briefs filed by, and oral arguments presented by, Counsel Supporting the Complaint and Respondent on the issues of remedy, the Commission has now determined to issue a Final Order to remedy Respondent's

violations of Section 5 of the Federal Trade Commission Act. Accordingly,

It is ordered that the following Order to cease and desist be, and it hereby is, entered:

I.

IT IS ORDERED that for purposes of this Order, the following definitions shall apply:

A. "Action" means any lawsuit or other action, whether legal, equitable, or administrative, as well as any arbitration, mediation, or any other form of private dispute resolution, in the United States or anywhere else in the world.

B. "Compliance Officer" means the Person employed by Respondent pursuant to Paragraph III. of this Order.

C. "DRAM" means Dynamic Random Access Memory.

D. "First Royalty Period" means the period that begins on the date this Order is issued and ends on the date three years after the date this Order is issued.

E. "JEDEC" means the JEDEC Solid State Technology Association, originally known as the Joint Electron Device Engineering Council, a non-stock corporation organized and existing under the laws of the Commonwealth of Virginia.

F. JEDEC-Compliant DRAM Product means:

1. JEDEC-Compliant SDRAM and

2. JEDEC-Compliant DDR SDRAM.

G. JEDEC-Compliant Non-DRAM Product means memory controllers or other non-memory-chip components that comply with:

1. the SDRAM Standards,
2. the DDR SDRAM Standards, or
3. both the SDRAM Standards and the DDR SDRAM Standards.

H. JEDEC-Compliant DDR SDRAM means any DRAM that complies with the JEDEC DDR SDRAM specification, published as JESD 79, as revised (the "DDR SDRAM Standards").

I. JEDEC-Compliant SDRAM means any DRAM that complies with the JEDEC SDRAM Standard, published as JC 21-C, Release 4, as revised; or the JEDEC SDRAM standard, published as JC 21-C, Release 9, as revised (the "SDRAM Standards").

J. "Maximum Allowable Royalty Rates" means

1. During the First Royalty Rate Period, the maximum allowable royalty rates shall be no greater than the following percentages of Net Sales of JEDEC-Compliant DRAM Products or JEDEC-Compliant Non-DRAM Products:
   a. 0.25% for JEDEC-Compliant SDRAM;
   b. 0.5% for JEDEC-Compliant DDR SDRAM;
   c. 0.5% for JEDEC-Compliant Non-DRAM Products that comply with SDRAM Standards; and
   d. 1.0% for JEDEC-Compliant Non-DRAM Products that comply with DDR SDRAM Standards.

2. During the Second Royalty Rate Period, the maximum allowable royalty rate for JEDEC-Compliant DRAM Products and JEDEC-Compliant Non-DRAM Products shall be 0.0%.

3. Notwithstanding the calculations described in Paragraph I.J.1. and Paragraph I.K., the royalties per unit for JEDEC-Compliant Non-DRAM Products shall be limited to the following:

   a. For JEDEC-Compliant Non-DRAM Products that comply with the SDRAM Standards, royalties per unit shall not exceed the amount obtained by multiplying .005 by the average net sales per unit for single data rate controllers – as those products are defined in Rambus's licenses for JEDEC-Compliant Non-DRAM products in effect prior to July 31, 2006 – that all licensees reported to Rambus, pursuant to those licenses, prior to July 31, 2006.

   b. For JEDEC-Compliant Non-DRAM products that comply with the DDR SDRAM Standards, royalties per unit shall not exceed the amount obtained by multiplying .01 by the average net sales per unit for double data rate controllers – as those products are defined in Rambus's licenses for JEDEC-Compliant Non-DRAM products in effect prior to July 31, 2006 – that all licensees reported to Rambus, pursuant to those licenses, prior to July 31, 2006.

4. JEDEC-Compliant Non-DRAM Products that comply with both the SDRAM Standards and the DDR SDRAM Standards shall all be treated, for purposes of calculating the Maximum Allowable Royalty Rates for such products pursuant to Paragraphs I.J.1.-3., as products that comply with DDR SDRAM Standards.

K. "Net Sales" means the gross sales amount invoiced or otherwise charged to customers of a licensee or its subsidiaries, less amounts invoiced for returned goods for which a refund is given, less separately stated charges for insurance, handling, duty, freight, and taxes, where such items are included in the invoiced price, and less credit amounts invoiced; *provided, however,* that (1) for each JEDEC-Compliant DRAM Product sold by the licensee at a combined price covering both the JEDEC-Compliant DRAM Product and a module, board, or system, Net Sales shall be calculated based on the licensee's average gross selling price for the relevant JEDEC-Compliant DRAM Product alone, during the relevant calendar period, less the deductions specified above; and (2) for each JEDEC-Compliant Non-DRAM product sold by the licensee at a combined price covering both the JEDEC-Compliant Non-DRAM Product and a board or system, Net Sales shall be calculated based on the licensee's average gross selling price for the relevant JEDEC-Compliant Non-DRAM Product alone, during the relevant calendar period, less the deductions specified above.

L. "Person" means natural person, partnership, joint venture, firm, corporation, association, trust, unincorporated organization, joint venture, or other business or legal entity, including any governmental entity.

M. "Relevant Foreign Patents" means all current or future patents issued by a foreign government to Respondent that claim a priority date of June 17, 1996, or before.

N. "Relevant U.S. Patents" means all current or future United States patents that claim priority back to U.S. Patent Application Number 07/510,898, filed on April 18, 1990, or to any other U.S. Patent Application filed by or on behalf of Rambus on or before June 17, 1996.

O. "Respondent" or "Rambus" means Rambus Inc., its directors, officers, employees, agents, representatives, successors, and assigns; its joint ventures, subsidiaries, divisions, groups and affiliates controlled by Rambus Inc.. and the respective directors, officers, employees, agents, representatives, successors, and assigns of each.

P. "Second Royalty Period" means a period to begin on the date after the First Royalty Period expires and to end on the date on which the last of Respondent's Relevant U.S. Patents and Relevant Foreign Patents expires.

Q. "Standard-Setting Organization" means any group, organization, association, membership or stock corporation, government body, or other entity that, through voluntary partic-

ipation of interested or affected parties, is engaged in the development, promulgation, promotion or monitoring of product or process standards for the electronics industry, or any segment thereof, anywhere in the world.

II.

IT IS FURTHER ORDERED that, while a member of or a participant in a Standard-Setting Organization, Respondent:

A. Shall not make any misrepresentation or omission to the Standard-Setting Organization or its members concerning Respondent's patents or patent applications (including, but not limited to, failing to cooperate with the Compliance Officer in the satisfaction of his or her responsibilities as described in Paragraph III., below);

B. Shall make complete, accurate, and timely disclosures to the Standard-Setting Organization or its members concerning Respondent's patents or patent applications to the extent the rules, practices, and policies of such Standard-Setting Organization require such disclosure (including, but not limited to, cooperating with the Compliance Officer's satisfaction of his or her responsibilities as described in Paragraph III., below); and

C. Shall be prohibited from taking any other action or refraining from taking any other action that would lead the Standard-Setting Organization to develop a standard that would infringe a claim in any issued or future Rambus patents without knowledge by the Standard-Setting Organization of Respon-

dent's patents and patent applications and of the potential scope thereof.

III.

IT IS FURTHER ORDERED that:

A. No later than thirty (30) days after the date this Order becomes final, Respondent shall employ, at Respondent's expense, a Compliance Officer, or shall include within the responsibilities of a current employee of Respondent all the responsibilities of a Compliance Officer, as described in this Paragraph III.

1. The employee serving as the Compliance Officer shall be employed subject to the approval of the Commission, which approval Respondent shall seek pursuant to § 2.41(f) of the Commission's Rules of Practice, 16 C.F.R. § 2.41(f).

2. The Compliance Officer shall be the sole representative of Respondent for the purpose of communicating Respondent's existing and potential patent rights related to any standard under consideration by any and all Standard-Setting Organizations of which Respondent is a member or in which Respondent is a participant; *provided, however*, that the Compliance Officer may, subject to the approval of the Commission, delegate a portion of his or her responsibilities to another employee of Respondent if he or she is unable to satisfy his or her responsibilities as described in this Paragraph III. because of the large number of Standard-Setting Organizations of

which Respondent is a member or in which Respondent is a participant or because of the large number of standards under consideration by the Standard-Setting Organizations at any one time.

B. Respondent shall:

1. Provide the Compliance Officer with full and complete access to Respondent's books, records, documents, personnel, facilities and technical information relating to compliance with this Order, or to any other relevant information, as the Compliance Officer may reasonably request;

2. Assure that the Compliance Officer has all information necessary to satisfy his or her responsibilities as described in this Paragraph III.;

3. Cooperate with any reasonable request of the Compliance Officer, including, but not limited to, requests to develop or compile data and information for the Compliance Officer's use; and

4. Take no action to interfere with or impede the Compliance Officer's ability to satisfy his or her responsibilities as described in this Paragraph III.

C. Failure of the Compliance Officer to satisfy his or her responsibilities as described in this Paragraph III. Shall be considered a violation of this Order by Respondent, except to the extent that such failure results from misfeasance, gross negligence, willful or wanton acts, or bad faith by the Compliance Officer.

D. If at any time the Commission determines that the Compliance Officer has ceased to act or failed to act diligently, or is unwilling or unable to continue to serve, the Commission may require Respondent to employ a substitute to serve as Compliance Officer, or include within a different current employee's job responsibilities those of the Compliance Officer, in the same manner as provided by this Order.

E. Respondent shall, in its reports to the Commission submitted pursuant to Paragraph IX. of this Order, include a description of all disclosures made to all Standard-Setting Organizations pursuant to this Paragraph III., including the date of the disclosure, the patents and patent applications disclosed, the standards under consideration, and the Standard-Setting Organization to which it was made. The Compliance Officer shall verify each such report and submit supplemental reports directly to the Commission or its staff, on a confidential basis, to the extent the Compliance Officer considers such supplemental reports necessary.

IV.

IT IS FURTHER ORDERED that:

A. Respondent shall cease any and all efforts by any means, either directly or indirectly, in or affecting commerce as "commerce" is defined in Section 4 of the Federal Trade Commission Act, 15 U.S.C. § 44, to seek to collect or to collect, under the Relevant U.S. Patents and, with regard to imports or exports to or from

the United States, the Relevant Foreign Patents, any fees, royalties or other payments, in cash or in kind, relating to the manufacture, sale, or use of any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product after the date this Order becomes final, that are in excess of the Maximum Allowable Royalty Rates or are otherwise inconsistent with this Order.

B. Respondent shall allow any party to a license agreement that requires payment, under the Relevant U.S. Patents and, with regard to imports or exports to or from the United States, the Relevant Foreign Patents, of any fees, royalties or other consideration, in cash or in kind, relating to the manufacture, sale, or use of any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product after the date this Order becomes final, that are in excess of the Maximum Allowable Royalty Rates of this Order or are otherwise inconsistent with this Order, to terminate or rescind that license agreement – at the option of the licensee – without penalty, and release that licensee from any further payments pursuant to that license agreement that are in excess of the Maximum Allowable Royalty Rates or are otherwise inconsistent with this Order.

V.

IT IS FURTHER ORDERED that:

A. No later than thirty (30) days after the date this Order becomes final, Respondent shall offer and make available to all interested

persons, a worldwide, nonexclusive license under the Relevant U.S. Patents, to make, have made, use, offer to sell, or sell JEDEC-Compliant DRAM Products and JEDEC-Compliant Non-DRAM Products. Such licenses shall not seek to collect any fees, royalties or other consideration, in cash or in kind, in excess of or in addition to the Maximum Allowable Royalty Rates, other than fees in an amount not to exceed the fair market value of any services to be rendered by Respondent to the licensee to the extent such services have been rendered at the request of the licensee.

B. Notwithstanding the provisions of Paragraph V.A. of this Order, Rambus may include in the licenses offered pursuant to Paragraph V.A.,

1. a requirement that the licensee grant Rambus a royalty-free, nonexclusive license under the licensee's patents to make, have made, use, offer to sell, and sell any product, the manufacture, use, offer to sale, or sale of which would, if not authorized, infringe one of the licensee's patents by reason of the implementation or use of any Rambus interface technology or of any of the licensee's improvements to a Rambus interface technology (or by reason of the use of any apparatus required by (i) any Rambus interface technology or (ii) any of the licensee's improvements to a Rambus interface technology), where such infringement:

a. would not have occurred but for the implementation of the Rambus inter face technology or the licensee's improvement and

b. could not have been avoided by another commercially reasonable implementation or resulted from use of an example included in the Rambus interface technology or in the licensee's improvement; and

2. a right to sublicense Rambus's rights under the license provided pursuant to Paragraph V.B.1., to any and all of the other licensees of any Rambus interface technology that have provided reciprocal rights through Rambus to the licensee under Paragraph V.A. at no separate, additional royalty or other charge to that licensee, provided that such sublicensed rights shall be limited to the products as to which Rambus receives a license (as identified in Paragraph V.B.1.), and provided further that no sublicense shall be granted for the use of rights with respect to

a. semiconductor manufacturing technology, and

b. any other portion of any integrated circuit including, without limitation, the core of a memory integrated circuit.

C. A licensee pursuant to Paragraph V.A. may sublicense to its subsidiaries the rights that arise under a license pursuant to Paragraph V.A. at no additional royalty or charge to the licensee or sublicensee.

D. The license described in Paragraph V.A. shall continue until expiration of the last to expire of the Relevant U.S. Patents; *provided, however,* that:

1. The licensee may, solely at the option of the licensee, terminate the license at any time upon sixty (60) days' written notice to Respondent; and

2. If either party defaults in the performance of any material obligation under the license described in Paragraph V.A. and if any such default is not corrected within forty-five (45) days after the defaulting party receives written notice thereof from the non-defaulting party, the non-defaulting party, at its option, may, in addition to any other remedies it may have, terminate the license.

E. Rambus shall not argue in any Action that a licensee's acceptance of, or participation in, a license pursuant to Paragraph V.A. of this Order bars the licensee from:

1. asserting that any Relevant U.S. Patent or Relevant Foreign Patent is invalid, unenforceable, or not infringed or

2. offering any defense based on contentions that any Relevant U.S. Patent or Relevant Foreign Patent is invalid, unenforceable, or not infringed.

VI.

IT IS FURTHER ORDERED that Respondent shall cease and desist any and all efforts it has undertaken by any means, either directly or

indirectly, in or affecting commerce as "commerce" is defined in Section 4 of the Federal Trade Commission Act, 15 U.S.C. § 44, including, without limitation, the threat or prosecution of, or assertion of any affirmative defense in, any Action, to the extent that Respondent: (1) has asserted that any Person, by manufacturing, selling, or otherwise using any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product, infringes any Relevant U.S. Patents or by manufacturing, selling, or otherwise using any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product for import or export to or from the United States, infringes any Relevant Foreign Patents and (2) for periods after this Order becomes final, is seeking relief that would result in payments to Respondent in excess of the Maximum Allowable Royalty Rates or that would otherwise be inconsistent with the requirements of this Order.

VII.

IT IS FURTHER ORDERED that Respondent shall not undertake any new efforts by any means, either directly or indirectly, in or affecting commerce as "commerce" is defined in Section 4 of the Federal Trade Commission Act, 15 U.S.C. § 44, including, without limitation, the threat or prosecution of, or assertion of any affirmative defense in, any Action, pursuant to which Respondent: (1) asserts that any Person, by manufacturing, selling, or otherwise using any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product any time after the date this Order becomes final, infringes any Relevant U.S. Patents or by manufacturing, selling, or otherwise using any JEDEC-Compliant DRAM Product or JEDEC-Compliant Non-DRAM Product for

import or export to or from the United States any time after the date this Order becomes final, infringes any Relevant Foreign Patents, and (2) is seeking relief that would result in payments to Respondent in excess of the Maximum Allowable Royalty Rates or would otherwise be inconsistent with the requirements of this Order.

VIII.

IT IS FURTHER ORDERED that:

A. No later than thirty (30) days after the date this Order becomes final, Respondent shall distribute a copy of this Order and the complaint in this matter to JEDEC, to those members of JEDEC that Respondent contacted regarding possible infringement of any of its patents by JEDEC-Compliant DRAM Products or JEDEC-Compliant Non-DRAM Products, and to any other Person that Respondent contacted regarding possible infringement of any of its patents by JEDEC-Compliant DRAM Products or JEDEC-Compliant Non-DRAM Products.

B. No later than ten (10) days after the date this Order becomes final, Respondent shall distribute a copy of this Order and the complaint in this matter to every officer and director of Respondent, to every employee or agent of Respondent whose responsibilities include acting as Respondent's designated representative to any Standard-Setting Organization, and to every employee or agent having managerial responsibility for any of Respondent's obligations under this Order.

C. Until ten (10) years after the date this Order becomes final, Respondent shall furnish a

copy of this Order and the complaint in this matter to each new officer and director of Respondent and to every new employee or agent of Respondent whose responsibilities will include acting as Respondent's designated representative to any Standard-Setting Organization or who will have managerial responsibility for any of Respondent's obligations under the Order. Such copies must be furnished within thirty (30) days after any such persons assume their position as an officer, director or employee. For purposes of this Paragraph IX.C., "new employee" shall include without limitation any of Respondent's employees whose duties change during their employment to include acting as respondent's designated representative to any Standard-Setting Organization.

D. Until ten (10) years after the date this Order becomes final, Respondent shall furnish each Standard-Setting Organization of which it is a member and which it joins a copy of this Order, and Respondent shall identify to each such organization the name of the Compliance Officer who will serve as Respondent's designated representative to the Standard-Setting Organization.

IX.

IT IS FURTHER ORDERED that:

A. Respondent shall file a verified written report with the Commission setting forth in detail the manner and form in which it intends to comply, is complying, and has complied with this Order:

1. no later than sixty (60) days after the date this Order becomes final; and

2. annually for ten (10) years on the anniversary of the date this Order becomes final.

B. Respondents shall include in its reports, among other things required by the Commission, a full description of the efforts being made to comply with this Order, a description of all substantive contacts or negotiations relating to Respondent's participation in any Standard-Setting Organization of which Respondent is a member, the identity of all parties contacted, copies of all written communications to and from such parties, internal documents and communications, and all reports and recommendations concerning Respondent's participation in any Standard-Setting Organization.

C. Until ten (10) years after the date this Order becomes final, Respondent shall maintain records adequate to describe in detail any action taken in connection with the activities covered by this Order, including, but not limited to, the annual amount of royalties received from each licensee pursuant to Paragraph V. of this Order.

X.

IT IS FURTHER ORDERED that, for the purpose of determining or securing compliance with this Order, and subject to any legally recognized privilege, and upon written request with reasonable notice, Respondent shall permit any duly authorized representative of the Commission:

A. Access, during office hours and in the presence of counsel, to all facilities and access to inspect and copy all books, ledgers, accounts, correspondence, memoranda and other records and documents in the possession or under the control of Respondent relating to any matter contained in this Order; and

B. Upon five days' notice to Respondent and without restraint or interference from Respondent, to interview the Compliance Officer and any other of Respondent's officers, directors, or employees, who may have counsel present, regarding any such matters.

XI.

IT IS FURTHER ORDERED that Respondent shall notify the Commission at least thirty (30) days prior to (1) any proposed dissolution of Respondent; (2) any proposed acquisition, merger, or consolidation of Respondent; or (3) any other change in Respondent including, but not limited to, assignment or creation or dissolution of subsidiaries, if such change might affect compliance obligations arising out of this Order.

XII.

IT IS FURTHER ORDERED that this Order shall terminate twenty (20) years from the date this Order becomes final.

By the Commission, Commissioner Harbour and Commissioner Rosch dissenting.

Donald S. Clark
Secretary

SEAL
ISSUED: February 2, 2007

APPENDIX E

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 07-1086
Consolidated with 07-1124

RAMBUS INCORPORATED,
Petitioner

v.

FEDERAL TRADE COMMISSION,
Respondent

September Term 2007
Filed On: August 26, 2008

BEFORE: Sentelle, Chief Judge, and Ginsburg, Henderson, Randolph, Rogers, Tatel, Garland, Brown, Griffith, and Kavanaugh, Circuit Judges, and Williams, Senior Circuit Judge

ORDER

Upon consideration of respondent's petition for rehearing en banc, and the absence of a request by any member of the court for a vote on the petition for rehearing en banc; and the motions of movant-amici curiae Hewlett Packard Company and Cisco Systems, Inc., and movant-amici curiae American Antitrust Institute, Consumer Federation of America and Public Patent Foundation for leave and invitation of court to file amicus brief in support of respondent's petition and the lodged briefs; the motion of movant-

amicus curiae Hynix Semiconductor, Inc. for leave to file amicus brief in support of respondent, and the opposition thereto; and the motion of amicus curiae S.A. Oliva for leave and invitation to file amicus brief in opposition to respondent's petition and the lodged brief, it is

ORDERED that the petition be denied. It is

FURTHER ORDERED that the motions be dismissed as moot.

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

BY: /s/
MICHAEL C. MCGRAIL
Deputy Clerk

APPENDIX F

STATUTORY APPENDIX

1. 15 U.S.C. § 2 provides:

Monopolizing trade a felony; penalty

> Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony, and, on conviction thereof, shall be punished by fine not exceeding $100,000,000 if a corporation, or, if any other person, $1,000,000, or by imprisonment not exceeding 10 years, or by both said punishments, in the discretion of the court.

2. 15 U.S.C. § 45 provides in pertinent part:

Unfair methods of competition unlawful; prevention by Commission

(a) Declaration of unlawfulness; power to prohibit unfair practices; inapplicability to foreign trade

(1) Unfair methods of competition in or affecting commerce, and unfair or deceptive acts or practices in or affecting commerce, are hereby declared unlawful.

(2) The Commission is hereby empowered and directed to prevent persons, partnerships, or corporations, except banks, savings and loan institutions described in section 57a(f)(3) of this title, Federal credit unions described in section 57a(f)(4) of this title, common carriers subject to the Acts to regulate commerce, air carriers and foreign air carriers subject to part A of subtitle VII of title 49, and persons,

partnerships, or corporations insofar as they are subject to the Packers and Stockyards Act, 1921, as amended [7 U.S.C. 181 et seq.], except as provided in section 406(b) of said Act [7 U.S.C. 227(b)], from using unfair methods of competition in or affecting commerce and unfair or deceptive acts or practices in or affecting commerce.

(b) Proceeding by Commission; modifying and setting aside orders

Whenever the Commission shall have reason to believe that any such person, partnership, or corporation has been or is using any unfair method of competition or unfair or deceptive act or practice in or affecting commerce, and if it shall appear to the Commission that a proceeding by it in respect thereof would be to the interest of the public, it shall issue and serve upon such person, partnership, or corporation a complaint stating its charges in that respect and containing a notice of a hearing upon a day and at a place therein fixed at least thirty days after the service of said complaint. The person, partnership, or corporation so complained of shall have the right to appear at the place and time so fixed and show cause why an order should not be entered by the Commission requiring such person, partnership, or corporation to cease and desist from the violation of the law so charged in said complaint. Any person, partnership, or corporation may make application, and upon good cause shown may be allowed by the Commission to intervene and appear in said proceeding by counsel or in person. The testimony in any such proceeding shall be reduced to writing and filed in the office of the Commission. If upon such hearing the Commission shall be of the opinion that the method of competition or the act or practice in question is

prohibited by this subchapter, it shall make a report in writing in which it shall state its findings as to the facts and shall issue and cause to be served on such person, partnership, or corporation an order requiring such person, partnership, or corporation to cease and desist from using such method of competition or such act or practice. Until the expiration of the time allowed for filing a petition for review, if no such petition has been duly filed within such time, or, if a petition for review has been filed within such time then until the record in the proceeding has been filed in a court of appeals of the United States, as hereinafter provided, the Commission may at any time, upon such notice and in such manner as it shall deem proper, modify or set aside, in whole or in part, any report or any order made or issued by it under this section. After the expiration of the time allowed for filing a petition for review, if no such petition has been duly filed within such time, the Commission may at any time, after notice and opportunity for hearing, reopen and alter, modify, or set aside, in whole or in part any report or order made or issued by it under this section, whenever in the opinion of the Commission conditions of fact or of law have so changed as to require such action or if the public interest shall so require, except that

(1) the said person, partnership, or corporation may, within sixty days after service upon him or it of said report or order entered after such a reopening, obtain a review thereof in the appropriate court of appeals of the United States, in the manner provided in subsection (c) of this section; and

(2) in the case of an order, the Commission shall reopen any such order to consider whether such order (including any affirmative relief provision con-

tained in such order) should be altered, modified, or set aside, in whole or in part, if the person, partnership, or corporation involved files a request with the Commission which makes a satisfactory showing that changed conditions of law or fact require such order to be altered, modified, or set aside, in whole or in part. The Commission shall determine whether to alter, modify, or set aside any order of the Commission in response to a request made by a person, partnership, or corporation under paragraph (2) not later than 120 days after the date of the filing of such request.

(c) Review of order; rehearing

Any person, partnership, or corporation required by an order of the Commission to cease and desist from using any method of competition or act or practice may obtain a review of such order in the court of appeals of the United States, within any circuit where the method of competition or the act or practice in question was used or where such person, partnership, or corporation resides or carries on business, by filing in the court, within sixty days from the date of the service of such order, a written petition praying that the order of the Commission be set aside. A copy of such petition shall be forthwith transmitted by the clerk of the court to the Commission, and thereupon the Commission shall file in the court the record in the proceeding, as provided in section 2112 of title 28. Upon such filing of the petition the court shall have jurisdiction of the proceeding and of the question determined therein concurrently with the Commission until the filing of the record and shall have power to make and enter a decree affirming, modifying, or setting aside the order of the Commission, and enforcing the same to

the extent that such order is affirmed and to issue such writs as are ancillary to its jurisdiction or are necessary in its judgement to prevent injury to the public or to competitors pendente lite. The findings of the Commission as to the facts, if supported by evidence, shall be conclusive. To the extent that the order of the Commission is affirmed, the court shall thereupon issue its own order commanding obedience to the terms of such order of the Commission. If either party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts, or make new findings, by reason of the additional evidence so taken, and it shall file such modified or new findings, which, if supported by evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of its original order, with the return of such additional evidence. The judgment and decree of the court shall be final, except that the same shall be subject to review by the Supreme Court upon certiorari, as provided in section 1254 of title 28.

(d) Jurisdiction of court

Upon the filing of the record with it the jurisdiction of the court of appeals of the United States to affirm, enforce, modify, or set aside orders of the Commission shall be exclusive.